AMIGA WORLD

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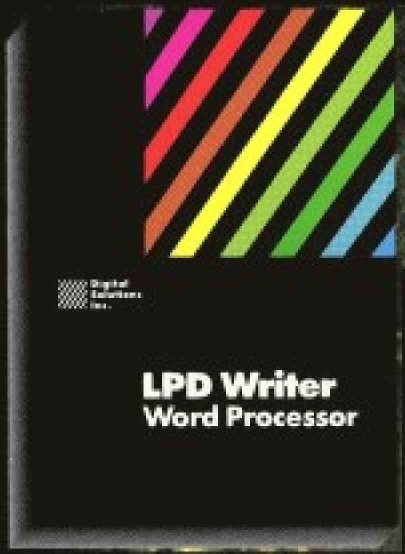
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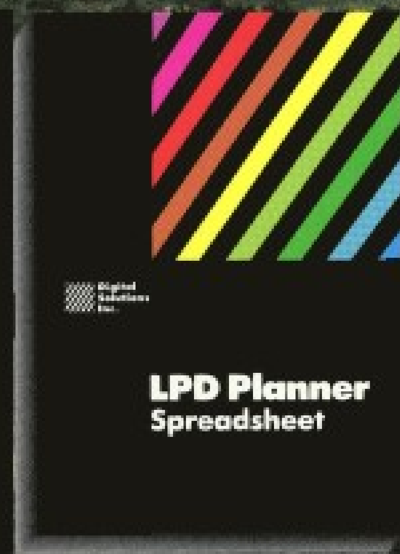
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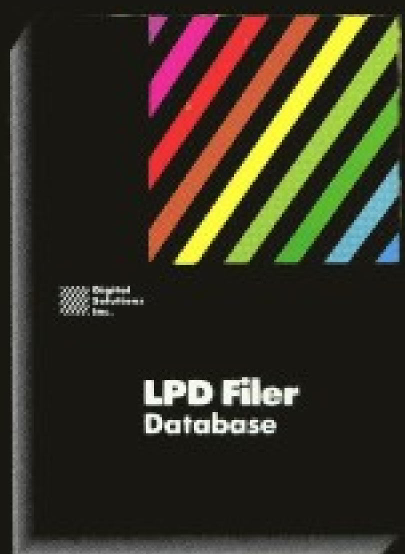
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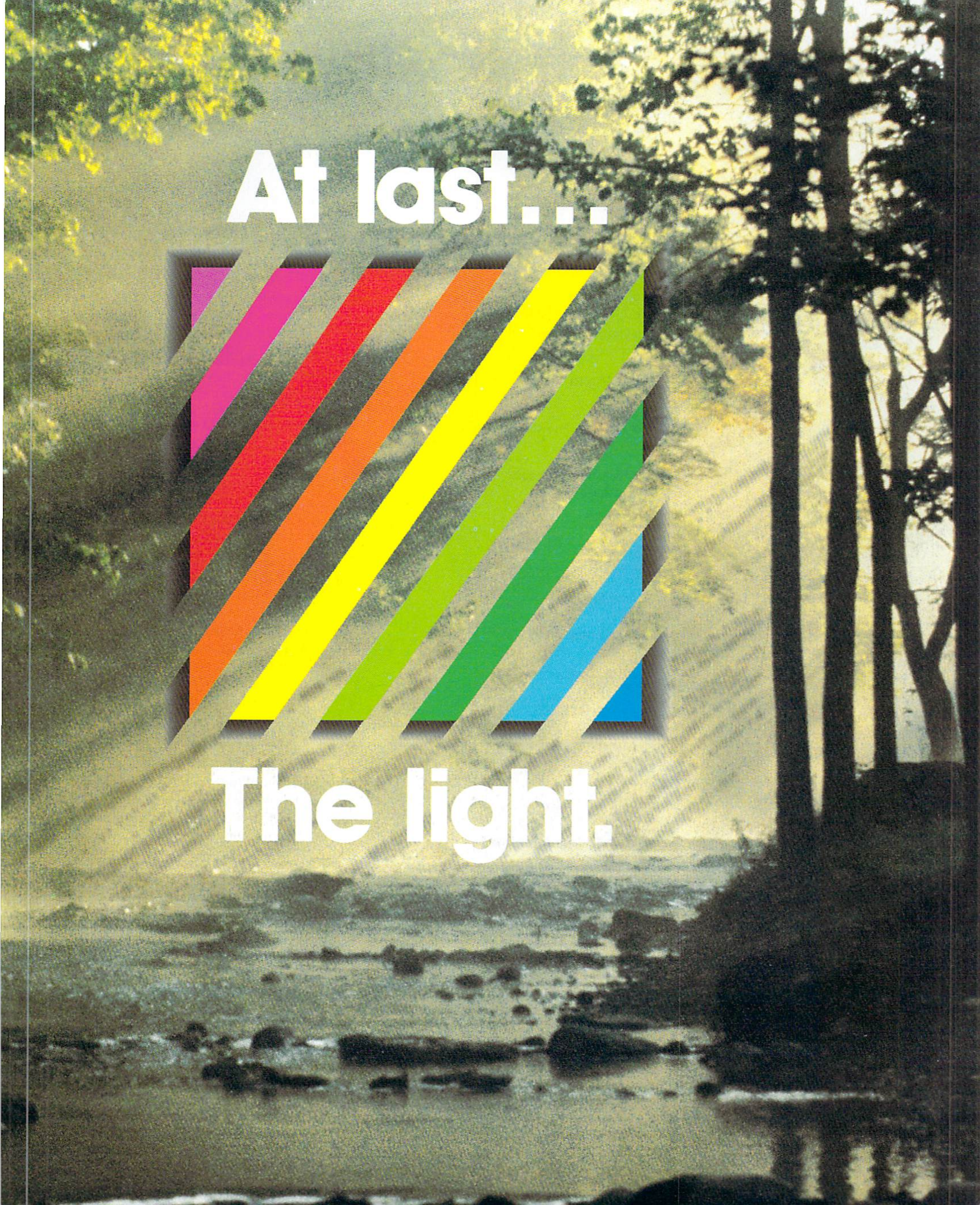
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FEATURES

MARCH/APRIL 1987

C O N T E N T S

VOLUME 3, NUMBER 2

AmigaWorld (ISSN 0883-2390) is an independent journal not connected with Commodore Business Machines, Inc. *AmigaWorld* is published bimonthly by CW Communications/Peterborough, Inc., 80 Elm St., Peterborough, NH 03458. U.S. subscription rate is $19.97, one year. Canada and Mexico $22.97, one year, U.S. funds drawn on U.S. bank only. Foreign Surface $39.97. Foreign Air Mail $74.97, U.S. funds drawn on U.S. bank. Second class postage pending at Peterborough, NH, and at additional mailing offices. Phone: 603-924-9471.

Postmaster: Send address changes to *AmigaWorld*, Subscription Services, PO Box 954, Farmingdale, NY 11735. Nationally distributed by International Circulation Distributors. *AmigaWorld* makes every effort to assure the accuracy of articles, listings and circuits published in the magazine. *AmigaWorld* assumes no responsibility for damages due to errors or omissions.

Zeitgeist

What Does the New Amiga Mean?

By Guy Wright

This column is probably not the first thing that you read in every issue. (It's the first thing that I read, but then again, I write it.) I imagine that most of you have already turned to the article on the new Amiga. *AmigaWorld* may not be as fast as television (or even the pony express) when it comes to getting out news flashes, but when you read about it in *AmigaWorld*, the information carries more weight and reality.

Finally! Another Amiga! GREAT! Since before the beginning, we have heard that there was going to be an entire line of Amigas. Rangers, B-52s and anything else people can dream of are still being talked about all the time. I had my own visions of the next Amiga, and I have to admit that I was only about 40 percent right. Now that I have seen the 2000, I am more impressed with Commodore's ability to engineer new computers than I am with the power of my own imagination. The 2000 is more than just a souped-up 1000, and yet it is not a drastic jump into a different operating system or disk file structure. It is still compatible with 1000 software, and it is possible for developers to adjust hardware configurations to allow peripheral compatibility as well. There are so many elements to the 2000 that we are going to be spending a lot of time in the future talking about its special features. If you don't see it in this issue, don't worry, we have a lot of time to peel back the 2000 petal by petal. This is just the start.

The article and photographs were all done in New York City with heavily armed Commodore guards breathing over our shoulders, making sure that we weren't slipping chips into our pockets. You wouldn't believe the rigmarole we had to go through to get a preview of the machine. Commodore has gotten very nervous about officially announcing things before they can ship them. (Note: the operative word here is "officially." We have all heard about products like the Sidecar, Genlock, etc. that took months to ship, but if you check the records, I think you will find that Commodore had "private showings" of these peripherals without "officially announcing" anything.) As far as I know, by the time you read this, the new Amiga will have been "officially announced" and on its way to market.



So what makes the 2000 so special? Sure it's nice to have the extra memory, the slots, the flexibility, etc., but what is so different about that? The thing that makes the 2000 truly unique is the fact that it is a "multi" machine. Multi-processor, multi-DOS and multitasking. The 2000 provides a bridge between systems, processors and operating environments. Most people don't care whether they are running their software or hardware under MS-DOS, AmigaDOS, Unix or gribbleflix, just as long as it works. The 2000 will provide a system, an "uber-system" if you will, that will make the software, hardware, etc. nearly invisible to the end user. No matter what kind of end use or application you need or want, the 2000 should let you buy the peripherals, processors, software, drives or whatever else is needed. With the 2000's multitasking abilities, giving you parallel coprocessing and parallel DOS, you have a machine that is almost unlimited in its configurations and potential. It will be a while before all the possibilities are grasped and implemented. Since the 2000 can act like almost any machine on the market, it is unlike any other machine on the market.

The article pretty much describes the machine, its inner workings, etc., but what we didn't talk about was the impact it's going to have. What does the new machine mean to the future of Commodore? What will it mean to software and hardware developers? What will it mean to everyone who already owns an Amiga 1000 and doesn't have enough money to go out and buy a whole new system? What will it mean to *AmigaWorld*?

As for the future of Commodore, I think the 2000 is a signal that Commodore is eager to make as great an impact in the U.S. business market as it has in Europe, but they know that they will have to offer more than just PC compatibility. Other computers offer that at a much lower price. Commodore wanted the 1000 to be a business machine, but the business world has been trained to look for certain things in a personal computer (whether they are right or not), and the Amiga didn't quite fit the description. The 2000 deals with most of the objections that the business world had about the 1000 as a business machine, since it unleashes the Amiga's full potential. The fact that Commodore is bringing out a new Amiga rather than a new C-64 or 128 proves that they are committed to the Amiga, not just as a single machine, but as an entire line. That is good for all Amiga owners. The 2000 should have good sales in the next few years, and the Amiga line will continue to grow. Yes, the 2000 will attract the business market, but ►


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I think it will appeal to the vertical markets first, such as desktop publishing and video, interactive training and business presentations. The expandability and flexibility (with custom and specialized boards) is going to sell the 2000 to people and businesses that need highly specialized features and don't care whose name is on the case.

What will the 2000 mean to developers? The software developers will either continue to develop for the 1000 and won't bother to make changes for the 2000, develop for both machines, or switch over to developing only for the 2000. Some developers will produce exclusively 2000 software as a way to break into a tight field (imagine a company with a new paint program trying to compete with Aegis and Electronic Arts), but most developers will continue to work on products that will run on both machines. Software products will add a depth of new features that fully utilize the 2000; the same software will run on a 1000, but these new features will require internal and external add-ons. There will be opportunities for new Amiga developers wanting to break into existing markets and new markets (e.g., software that makes use of both MS-DOS and AmigaDOS or unique ways to merge programs).

Hardware developers are the ones who will be most effected by the new 2000. All the add-ons developed for the 1000 will have to be redesigned, but, since everything for the 2000 is internal, the manufacturing costs will go down (manufacturers won't have to put their boards inside cases). The 2000 will give hardware people new opportunities to develop things like controller boards for PC hardware, but it will open up the competition for things like hard disks. Whatever happens, it should be interesting.

For all of you Amiga 1000 owners who don't have the extra $$$ to rush out and buy the new 2000, you will also be able to benefit from all of the new features of the 2000. With memory expansion cards available and external hardware options, a 1000 can do anything that a 2000 can do. Software will run on both machines, so developers won't be limiting their audience by working on 2000 software exclusively.

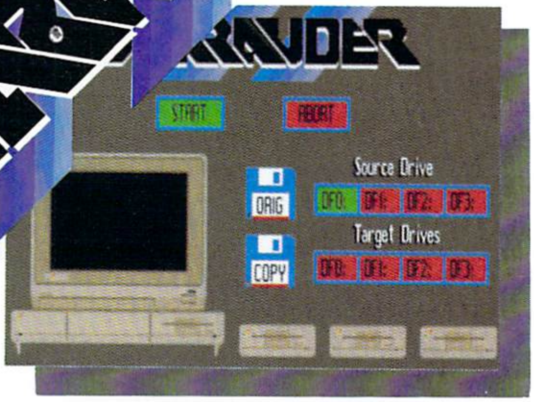
My best guess is that if you want the high-end specialty add-ons that are going to be developed for the 2000, then you will probably end up buying either a 2000 or the memory and slot peripherals for the 1000. However, offsetting that trend, there will probably be more inexpensive add-ons developed for the 1000 market. If you need a 50mb hard disk or super-clean composite video output and don't care about cost, then the 2000 will probably be your machine, but if you only need a 5-, 10- or 20mb hard disk at prices that are bound to come down, then stick with your 1000. If all you crave is PC compatibility, then the Sidecar should suffice.

Lastly, what will the Amiga 2000 mean to *AmigaWorld*? It will mean that we will have a lot more to cover, more advertisers, more machines out there, more readers and (I hope) more reasons to go monthly. It also means more work, more headaches, more confusion and more excitement, but I prefer it that way. I suppose that we will have to start giving more coverage to MS DOS when hybrid software begins to overlap the two operating systems, but we aren't going to turn into another PC-focused magazine. Nor are we going to become a business magazine. There are many, many areas of common interest to all Amiga owners, whether they own 1000s, 2000s or whatever else comes along. Additionally, *AmigaWorld* will integrate coverage of the new vertical markets. We will adapt to the situation, getting bigger or more frequent or both. Whatever we do, you can bet we will remain the best.■

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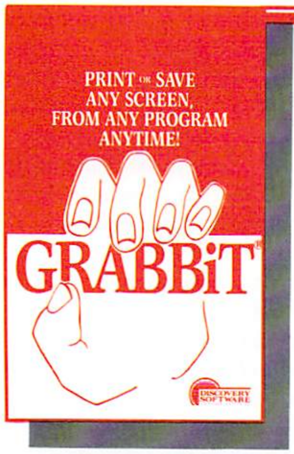
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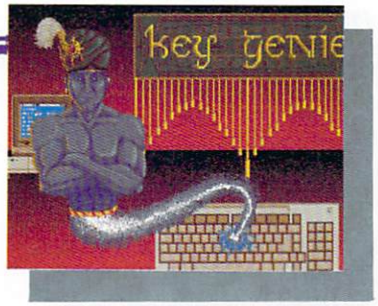
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Repartee

From the Livingroom. . .

Our family just loves the Amiga. We recently completed a project using the Amiga, two VCRs, a slide projector, TV camera, audio cassette player, color monitor, microphone, Aegis Images and Digi-View software. The result was a unique travel log. We digitized several slides and added humorous commentaries with the text capability of Images. Dynamic, colorful script was used to introduce each country. An overall background soundtrack was dubbed over the video. Once this was completed, verbal commentary explained the details of the trip. The hookup was rather complicated, so my Dad handled that problem.

We really enjoyed the creative capability of the Amiga. This project even sparked my Mom's interest in the computer.

Noelle C. Adams *(age 14)*
Chesterland, OH

. . .to the Laboratory

As a professor of architecture writing a technical book, my Amiga has been my constant companion for many months. It has done everything I have asked of it—word processing, spreadsheets, data management, matrix algebra and other calculations, and all the drawings that will appear in my book, as well as the color lecture slides that will accompany it. The Amiga, the furthest thing I can think of from a door stop, is a real tiger. All the other computers in our university computer labs (all of the best ones are there) seem like old gray mares after using the Amiga. I see that some Amiga owners with little appreciation of the graphic and plastic arts have been put off, perhaps intimidated, by your coverage of the Amiga's prowess in the visual arts that are so much a part of my personal and professional life. But take heart, there is a tremendous ground-swell of those such as I who are exploring and exploiting the Amiga for the many things it can do for us.

Eugene E. Crommett, Ph.D.
University of Puerto Rico
San Juan, PR

Whither Tecmar?

I see one notable omission in your Hardware Buyer's Guide [Jan./Feb. '87]—a full line of expansion units from Tecmar. What happened at Tecmar? As I believe, they were among the first to offer hardware for the Amiga. Their line included the T-card expansion unit, T-disk hard disk and the T-modem, which offered features not available elsewhere, such as tone-decode and audio-circuit access.

Has Tecmar discontinued their line of Amiga products?

Mark Barnes
Los Angeles, CA

Tecmar is no longer manufacturing products for the Amiga market. Also out of the picture is The Micro Forge and their line of Amiga hardware.

—Editors

Wanted: Professional Software

I feel very fortunate that I do not need to use my Amiga for any serious business applications. Since I have purchased my machine, only a few quality business packages have been introduced. I have yet to find a word processor that supports mail merge and macro functions. Finding hardware at a reasonable price seems to be a problem, too. Did Commodore lack the confidence or the ability to develop a line of peripheral hardware such as a hard drive, a color printer or an expansion chassis?

Developers must start to exploit this machine's power for CAD, business and desktop publishing. Real-time I/O control and monitoring are also possible applications for the Amiga.

Richard A. Ireland
Charleston, WV

Up until now, there wasn't a system under $2,000 that could meet the needs of small businesses without requiring the user to also be a programmer. The Amiga, with the right software, could solve a lot of the problems encountered by small businesses.

Question: Isn't the Amiga multitasking? Why doesn't the software act like it?

IBM PCs, Apples and the rest, including the Amiga, make you do the same re-entry into a dozen separate, non-integrated software packages. It's easier and cheaper to use a Dome Ledger ($3.95) than an IBM PC ($3,950). Unless Amiga software can be created to solve problems for attorneys, students, printers, artists, store owners, salesmen and writers, then the Amiga is doomed to anonymity.

R. Skip Uldriks
Holmes Beach, FL

As editors of AmigaWorld, *you are probably in touch with software developers all the time. Let them know that we Amiga owners need high-quality output for our graphics (business graphics and slides), such as output to a 2,000- to 4,000-line film recorder. Also, we need a quality desktop-publishing package with output to a black-and-white laser printer, such as an Imagen 8203 XP or another high-quality laser printer capable of printing a full page at 300 DPI or better. Without this kind of output, the Amiga cannot compete with the Macintosh or IBM PC AT, both of which already have this professional software.*

Ron Dube
Ossining, NY

Scribble! Rebuttal

I have just read the review of Scribble! [Jan./Feb. '87, p. 78] and have to give my views about it. Although the review was not of version 2.0, which I am using, I believe my comments are still applicable.

Mr. Watt and I disagree on one major aspect of the program. He complains that the program forces you to use embedded commands to change the text format in the middle of a document. If I am that picky about the layout of text at the time of entering it, I might just as well use ED or Notepad. With all this computing power available, why should I have to do all the work of formatting text? I would even like to see a few more dot commands. The feature I miss most from my old word processor (Scripsit, on a TRS-80 M4) is vertical centering, which made letter formatting easy. Scripsit also had an automatic paragraph indent and blank line ability.

When I'm writing something, I just want to write. The layout can come later, when the text is finished.

Dennis Lee Bieber
Sunnyvale, CA

See Douglas Watt's review of Scribble! 2.0 in this issue, p. 94.

—Editors

Send your letters to: Repartee, *AmigaWorld* editorial, 80 Elm St., Peterborough, NH 03458. Letters may be edited for space and clarity.■

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Hors d'oeuvres



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We hope you enjoy these latest offerings. Be sure to use backups of your original disks for experimenting, and if you find anything here that seems half-baked, let us know.

Clearing Keyboard Buffer In BASIC

The ability to type ahead on the Amiga is usually a good thing to have, but it can sure mess up the INKEY$ statement in a BASIC program. The following subroutine will make sure no old, garbage keypresses are mistaken for a response.

```
SUB CLEARKEYS STATIC
FOR X = 1 TO 10
r$ = INKEY$
NEXT X
ENDSUB
```

To use, call it immediately before the INKEY$ statement. Example:

```
CALL CLEARKEYS
WHILE INKEY$ = "": WEND
```

Margaret Hettinger
Lebanon Junction, KY

Faster Downloads

For those of you who have ever tried to download a large file from a BBS or one of the major networks, you may have noticed that the transfer really slows down waiting for the disk drive to finish writing after each block. This is especially noticeable when using Xmodem, since it uses 128-byte blocks. The solution is to send the file to RAM:. From the CLI you can open another CLI with NEWCLI. Then load your terminal program from the first CLI. After you finish the download, simply move the front window up out of the way and click in the second CLI window. Then type:

COPY RAM: *file name* TO *drive number*
DELETE RAM: *file name*

With a 512K machine using Micro-Systems Software's Online!, you can get about 199K in the RAM disk before total machine lockup (I found that out the hard way!). The longer the file, the greater the time savings realized. This technique is especially useful when calling long distance to get that public-domain program that you just can't live without.

Ken Baynard
K.I. Sawyer AFB, MI

C Compiler Printouts

I was having difficulty compiling a program in C when I thought how nice it would be to have a hard copy of the compiler errors to discuss with other programmers. The command format for Manx's Aztec C compiler is:

```
cc <-option> filename
```

Thinking this chore would be easy, I tried to redirect the console output to the printer by typing:

```
cc filename > prt:
```

However, the compiler treated > prt: as a parameter, since options can appear either before or after the name of the C source file that resulted in an error. Due to a quirk of the system, prt: should precede compiler invocation so that:

```
cc > prt: <-option> filename
```

will properly compile *filename* and redirect output to the printer and return output to the console after compilation is executed.

Sam Spear
Fort Worth, TX

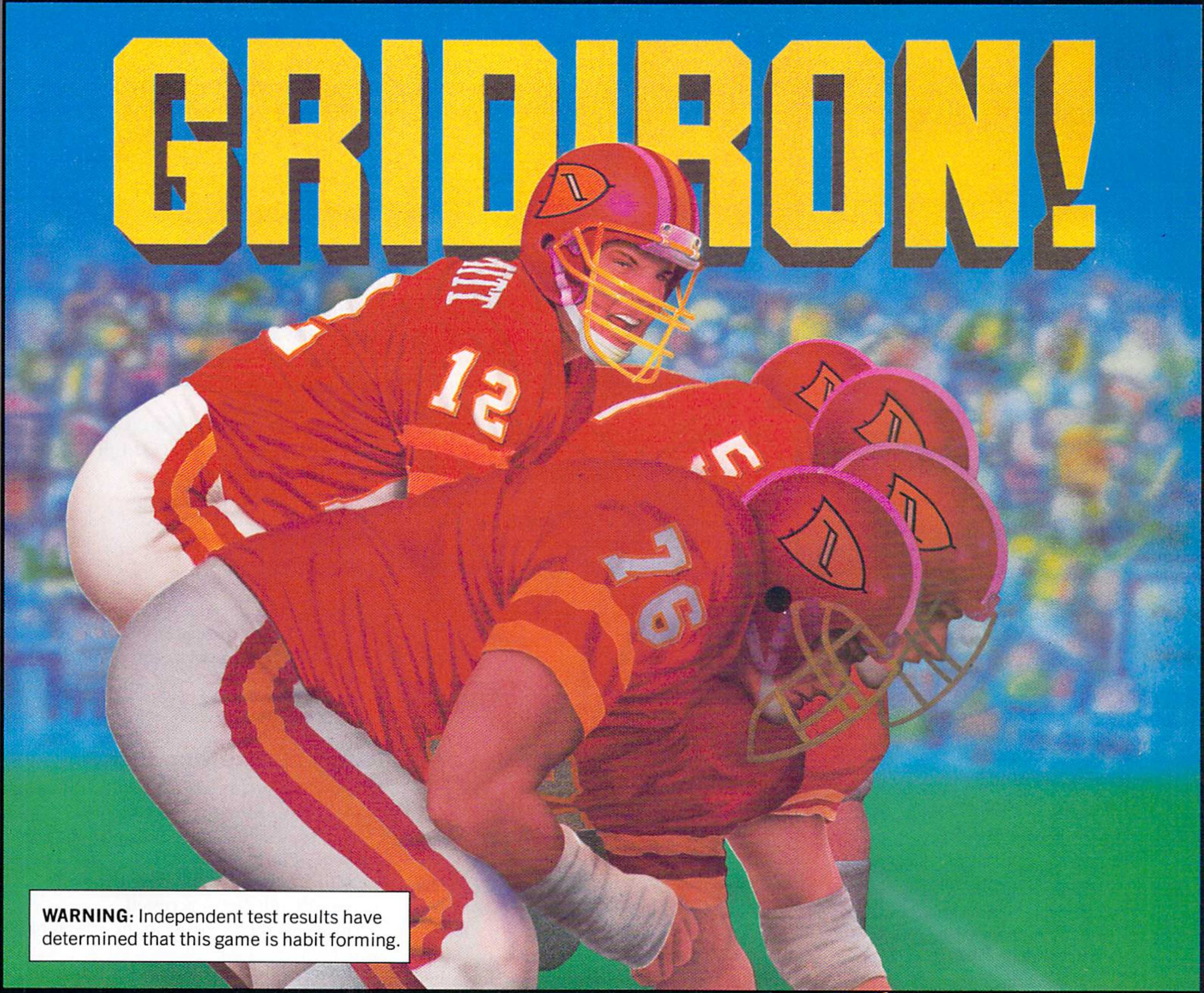
Break Key

Every time I try to download something from a BBS using Micro-Systems' BBS-PC, I get a message saying "use break to cancel." Try as I might, I could never find a break key on the keyboard. Well, I'll be damned! Break on the Amiga keyboard is a combination of the ALT and C keys. Many mainframes and network systems use break to stop transmissions or to kill a running program, so it is a good thing to be aware of.

Mike Smithwick
Los Altos Hills, CA

Saving Custom Icons

When I discovered how to use the Icon Editor on the Workbench disk, I made useful icons for my Amiga Basic programs.


GRIDIRON!
WARNING: Independent test results have determined that this game is habit forming.

However, when I made an adjustment in the program and re-saved it, my custom icon was replaced with the standard flowchart icon that is created for every Amiga Basic program when it is initially saved.

There are two solutions to this problem. One is to keep an icon library and use the Icon Editor to replace the standard icon with your custom icon.

The other solution is implemented without leaving Amiga Basic, and leaves you with an old (unmodified) copy of the program.

First, get into the intermediate mode and type SAVE OLD. Now you have a new copy of the program with a standard icon and an old copy of the program with your custom icon. All you have to do now is switch the programs.

In the intermediate mode, type:

NAME OLD AS TEMPORARY
NAME *your program's name* AS OLD
NAME TEMPORARY AS *your program's name*

Now you have the new program with the custom icon and the old program with the standard icon, so you can move the old copy somewhere else or into the trash until you know your modifications work correctly.

Derek Buckley
Spokane, WA

Quick CLI

I have an answer to the quick CLI problem. It's so simple it's almost not worth mentioning.

I moved my CLI from the System Drawer to the Workbench window itself; now when I open my Workbench, there's the CLI. This also saves the trouble of typing LOADWB or trying to press CTRL–D at just the right time.

Larry H. Larson
Austin, TX

Icon System Solution

Here is a solution to Mr. Raidma's problem [Help Key, Nov./Dec. '86, p. 127] which will allow him to keep Amiga Basic in his drawer labeled "BasicWork."

With Workbench loaded, first click once on the icon for the Basic program. Next, select Info from the Workbench menu by highlighting it and releasing the mouse button. When the Info window comes onto the screen, change the default tool from :AMIGABASIC to :BASICWORK/AMIGABASIC. This will direct the icon system to load Amiga Basic from the BasicWork drawer. I tried it and it works for me.

Dr. Michael J. Doyle
Bel Air, MD

SAY from BASIC

If you want to use the Say (voice) function, the best method is to store the spoken text in a sequential data file created with the built-in ED function or any word processor that allows an ASCII save. After the file is created, add the following lines to your Amiga Basic program:

```
OPEN file name FOR INPUT AS #1
  REM file name CREATED USING ED
WHILE NOT EOF(1)
LINE INPUT#1,A$
SAY TRANSLATE$(A$)
WEND
CLOSE #1
```

You can listen to the spoken text before placing it in your program by opening a CLI window and typing SAY –X *file name.*

Karl Dittman
Salem, MO

Copy of Another Type

Another way to copy a file is by using the Type command under the CLI.

The Type command will display the contents of a file in either ASCII or hex, depending upon the option used and, of course, the file being accessed.

Normally, the return is to the screen or prt:. However, I have discovered that it can also be to a disk or file, and if a file is not specified, one is created.

The format is as follows:

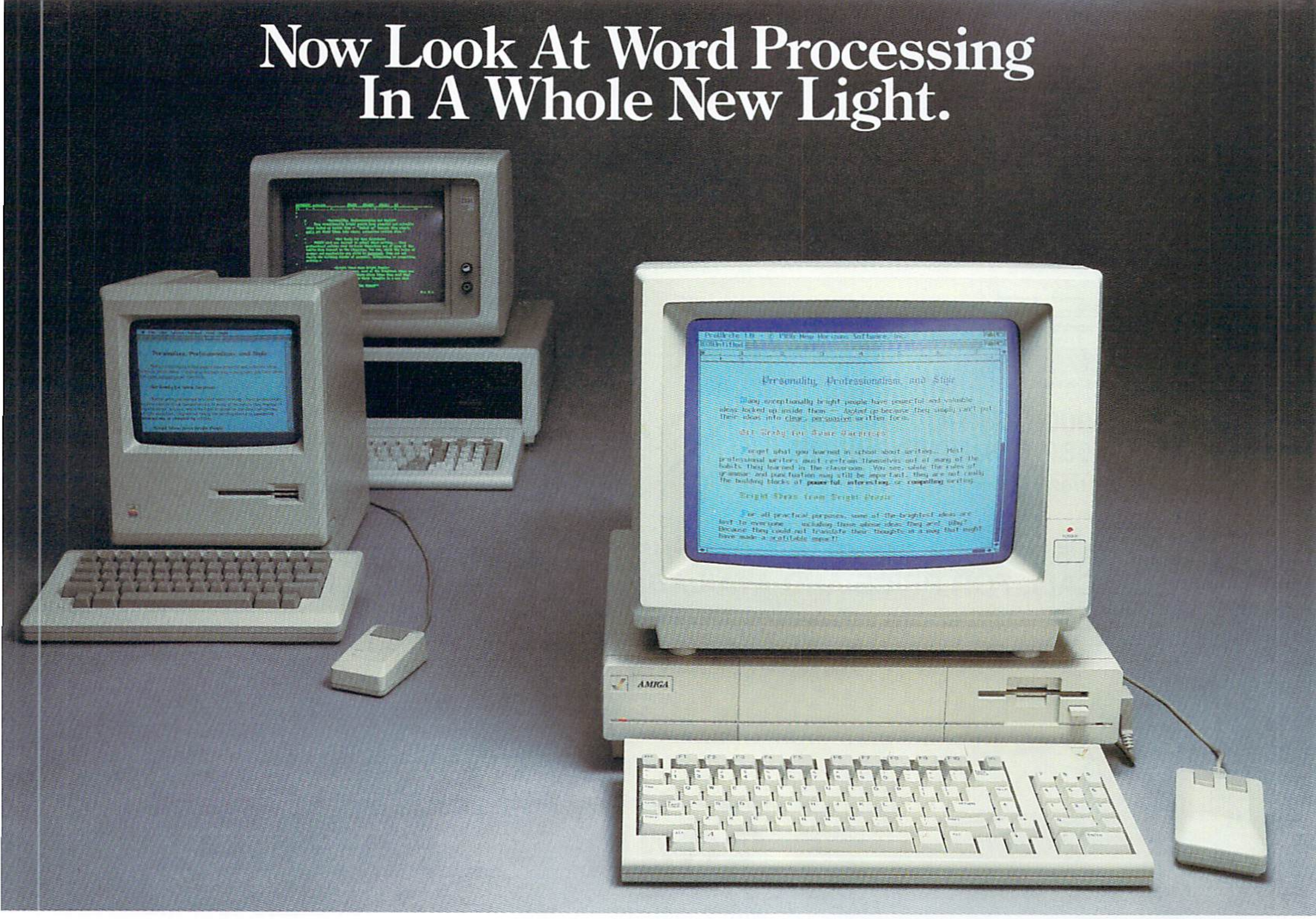
TYPE DF?: *file name* TO *file name*

For example, let's say you have a file on a disk in drive 1 called AmigaWorld and you want a copy on the disk in drive 0 to be called Mags. In the CLI, you would type the following command string:

TYPE DF1:AMIGAWORLD DF0:MAGS

Note that the use of TO is optional. When you now do a directory search, you should find a new file called MAGS on DF1:.

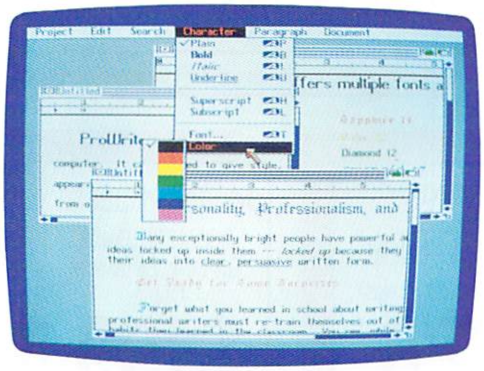
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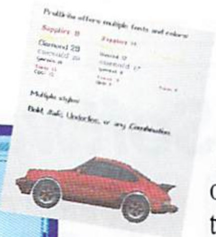
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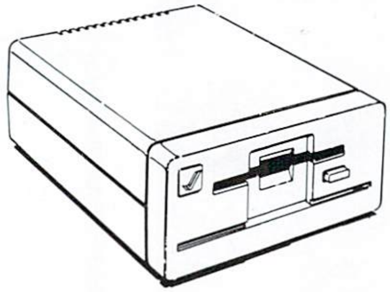
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Atari 520ST screens shown



"0300 Hours. Two hours until dawn. Radar picks up convoy, escorted by two destroyers. We believe that one of the enemy's valuable oil tankers is part of convoy formation."



"0400 Hours. Lookouts on the bridge. Target identification party reports one tanker, 6,000 tons, troopship of 10,250 tons, with two *Kaibokan*-type escorts. Moving into attack position."



"0500 Hours. Sound General Quarters! Battle stations manned. Preparing for torpedo run. Gauge Panel OK. Periscope Ok. Charts and Attack Plot Board OK. All mechanical systems OK."



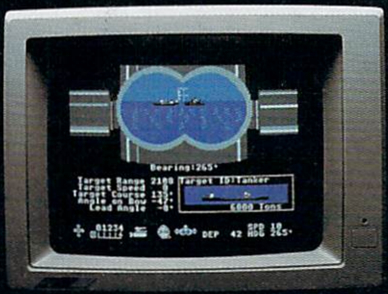
"0525 Hours. Torpedo rooms report full tubes forward and aft. Battery at full charge for silent running. We hope water temperature will provide thermal barrier to confuse enemy sonar."



"0600 Hours. We are at final attack position. Convoy moving at 10 knots. Target distance decreasing rapidly . . . Crash Dive! Escorts have spotted us and are turning to attack! Rig to run silent."



"0700 Hours. Depth charged for one hour. Some minor damage, but repair parties at work. Destroyer propeller noises receding. We'll come to periscope depth for our return punch."



"0715 Hours. Torpedo tubes 1, 2, 3 fired. Two destroyers hit and sinking. One of the enemy's last tankers coming into 'scope view – an ideal target position. On my mark . . . Fire Tube 4! Fire 5!"



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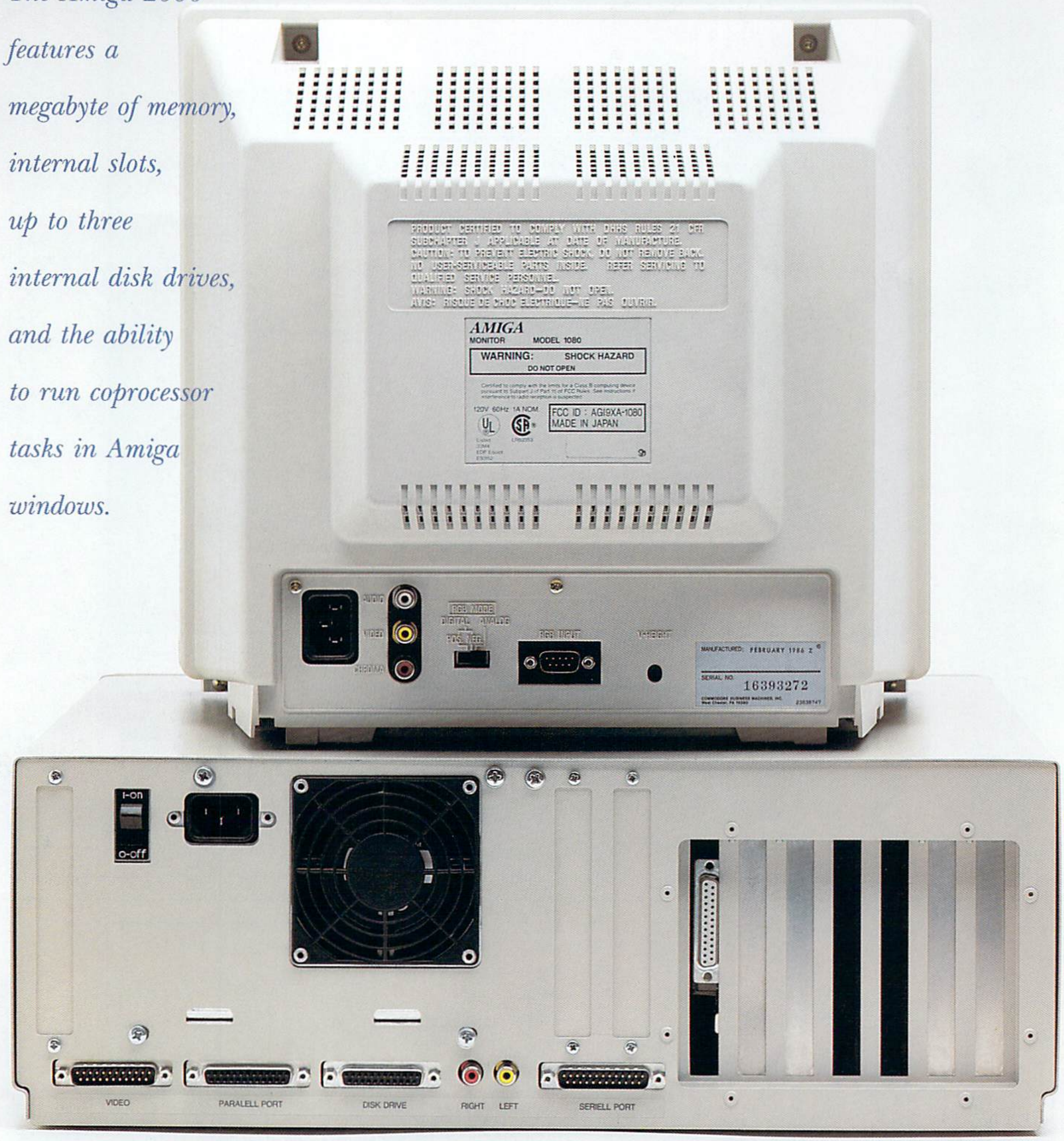
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BACK IN FRONT...

The Amiga 2000 features a megabyte of memory, internal slots, up to three internal disk drives, and the ability to run coprocessor tasks in Amiga windows.

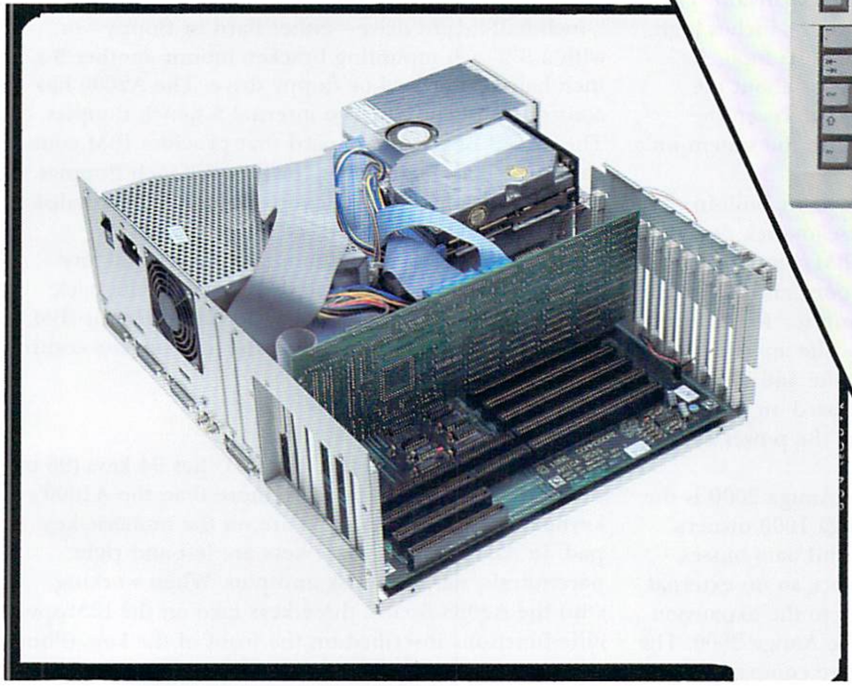


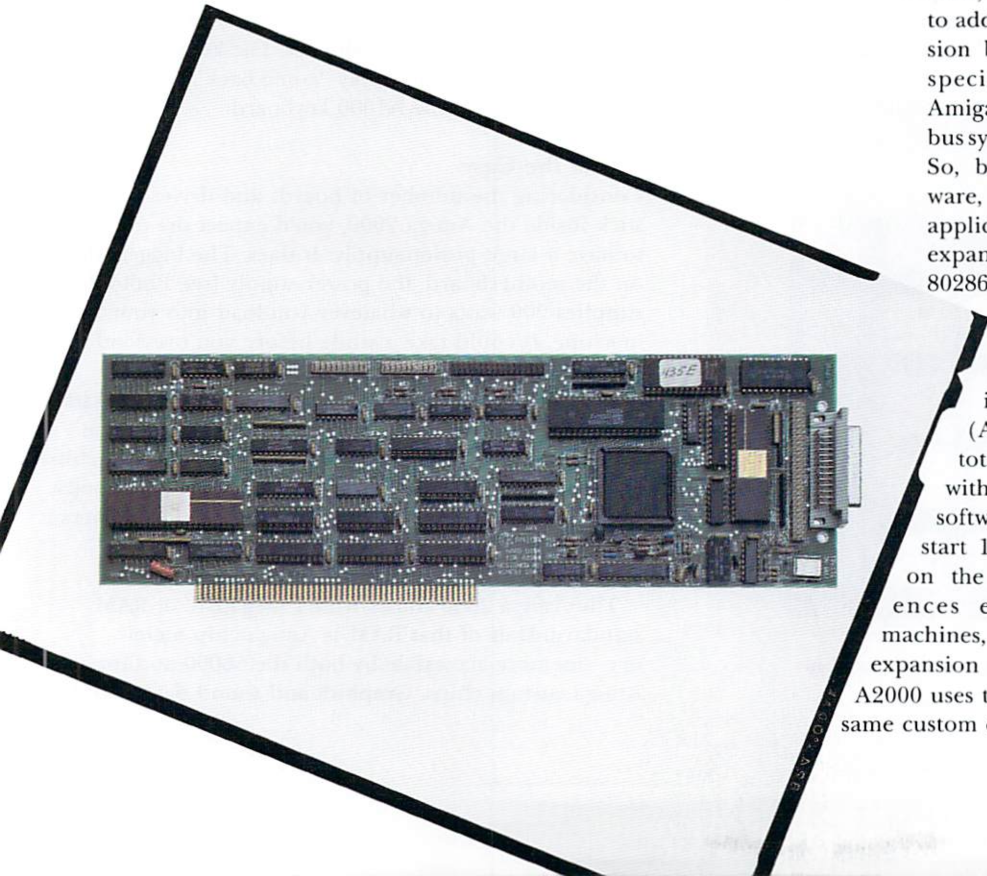
PHOTOGRAPHED BY AARON REZNY

AMIGA AGAIN


The New 2000
AMIGA
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By Bob Ryan

THE AMIGA 2000 is a new computer from Commodore that provides more standard memory than the Amiga 1000, internal slots for easy expandability, and the option to add IBM PC/XT software compatibility with an expansion board—the A2088 Board. In addition to Amiga-specific expansion slots, the Amiga 2000 has an IBM PC/AT bus system built into the machine. So, besides running IBM software, the A2000 gives your IBM applications access to IBM PC expansion hardware, including 80286 and 80386 boards.

While adding Amiga expansion slots and (optionally) IBM compatibility, the Amiga 2000 (A2000) has remained totally software compatible with the Amiga 1000 (A1000); software that runs under Kickstart 1.2 on the A1000 will run on the A2000. Hardware differences exist between the two machines, but these concern the expansion ports and busses. The A2000 uses the same processor and the same custom chips as the A1000. The ►

Photo 1. Amiga 2000 keyboard. Changes from the A1000 keyboard include new placements for the Help, Delete and cursor keys, and an IBM-style numeric keypad.

Photo 2. Inside the Amiga 2000. The power supply (upper-left corner) and disk drives (upper center) are suspended above the motherboard on an eight-screw mount. Also shown is the A2094 Hard Disk/SCSI Controller.

Photo 3. A2094 Hard Disk/SCSI Controller.

Amiga 2000 doesn't make the A1000 obsolete—the graphics modes, for instance, are identical—but it is a much more versatile, expandable, compatible, and, ultimately, more powerful machine.

System Description

The Amiga 2000 uses the MC68000 processor. It comes with one megabyte (million bytes) of RAM, one half-height, internal 3 ½-inch floppy drive that can store 880K of programs and data, a detachable, 94-key keyboard and a two-button mouse. It also has five Amiga and four IBM PC/AT slots for internal expansion. The Amiga 2000 system box is a metal case 6 ⅜-inches high, 17 $\frac{7}{16}$-inches wide and 15 ⅝-inches deep. Its footprint—the area it occupies on a desk—is about the same as the A1000. Unlike the A1000, however, the A2000 keyboard can't be stored beneath the system unit when not in use.

Like the 1000, the Amiga 2000 has many built-in ports. On the front are the two mouse/joystick ports. On the back are a Centronics- and IBM-compatible parallel port, an IBM-compatible serial port, an RGB video port, stereo sound output and a connector for an external disk drive. Missing are the composite and RF connectors found on the A1000. Composite and RF output are optional on the A2000. The keyboard on the A2000 connects to the front of the machine; the power cord to the back.

Conspicuous by its absence on the Amiga 2000 is the 86-pin edge connector that gave Amiga 1000 owners direct access to the A1000's address and data busses. The A2000 has internal expansion slots, so no external bus is provided. Devices that connect to the expansion bus on the A1000 can't connect to the Amiga 2000. The Amiga 2000, therefore, is not hardware compatible with the A1000. According to Commodore, however, third-party hardware developers will provide expansion boxes for the A1000 that will give A1000 owners access to all peripherals developed for the A2000.

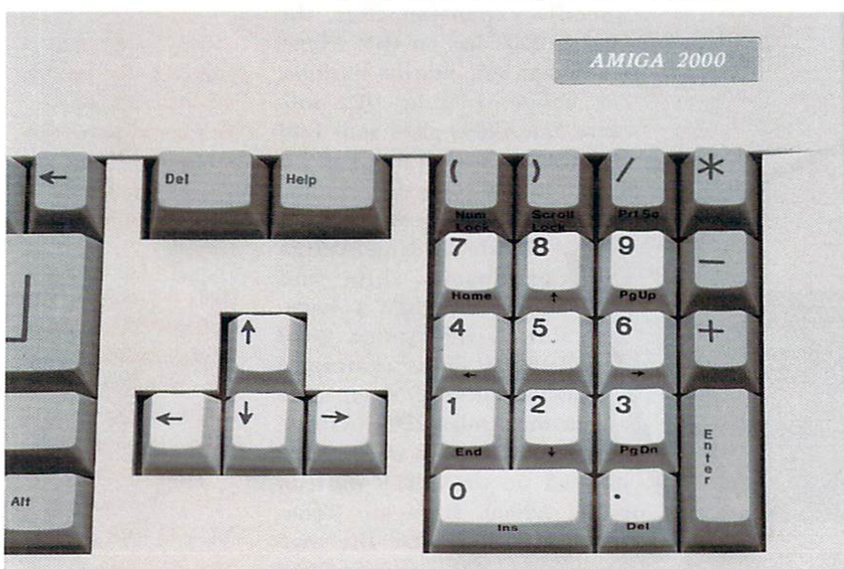


Photo 4. Numeric Keypad. Inscribed on the front of some keys is the function they assume in IBM mode.

You can use standard interface cables with the Amiga 2000 serial and parallel ports; Commodore has changed the pin-outs of these ports to comform to industry standards (See Figure 1 for the pin-outs of the parallel and serial ports).

Drive Configuration

In addition to the one standard disk drive, the Amiga 2000 can mount two more disk drives in the front of the machine. You can put another half-height 3 ½-inch floppy, or a half-height 3 ½-inch hard drive next to the standard drive. Below these two, you can mount one 5 ¼-inch half-height drive—either hard or floppy—or, with a 3 ½-inch mounting bracket, mount another 3 ½-inch half-height hard or floppy drive. The A2000 has controllers to support two internal 3 ½-inch floppies. The A2088 Board—the board that provides IBM compatibility—has a controller for four 5 ¼-inch floppies. You will have to supply a controller for any hard-disk drive mounted in the front of the machine.

In addition to the front-mounted drives and any drives connected to the disk drive port on the back, you can attach other disk drives to the Amiga or IBM side of the system by supplying the appropriate controller board.

The Keyboard

The Amiga 2000 keyboard (Photo 1) has 94 keys (96 on the international version), five more than the A1000's keyboard. The five new keys are on the numeric keypad. In Amiga mode, these keys are left and right parenthesis, slash, asterisk and plus. When working with the A2088 Board, these keys take on the IBM-specific functions inscribed on the front of the keys (Photo 4). These include Num Lock, Prt Sc, Scroll Lock and other IBM keys. The numeric keypad emulates the functions found on the IBM numeric keypad.

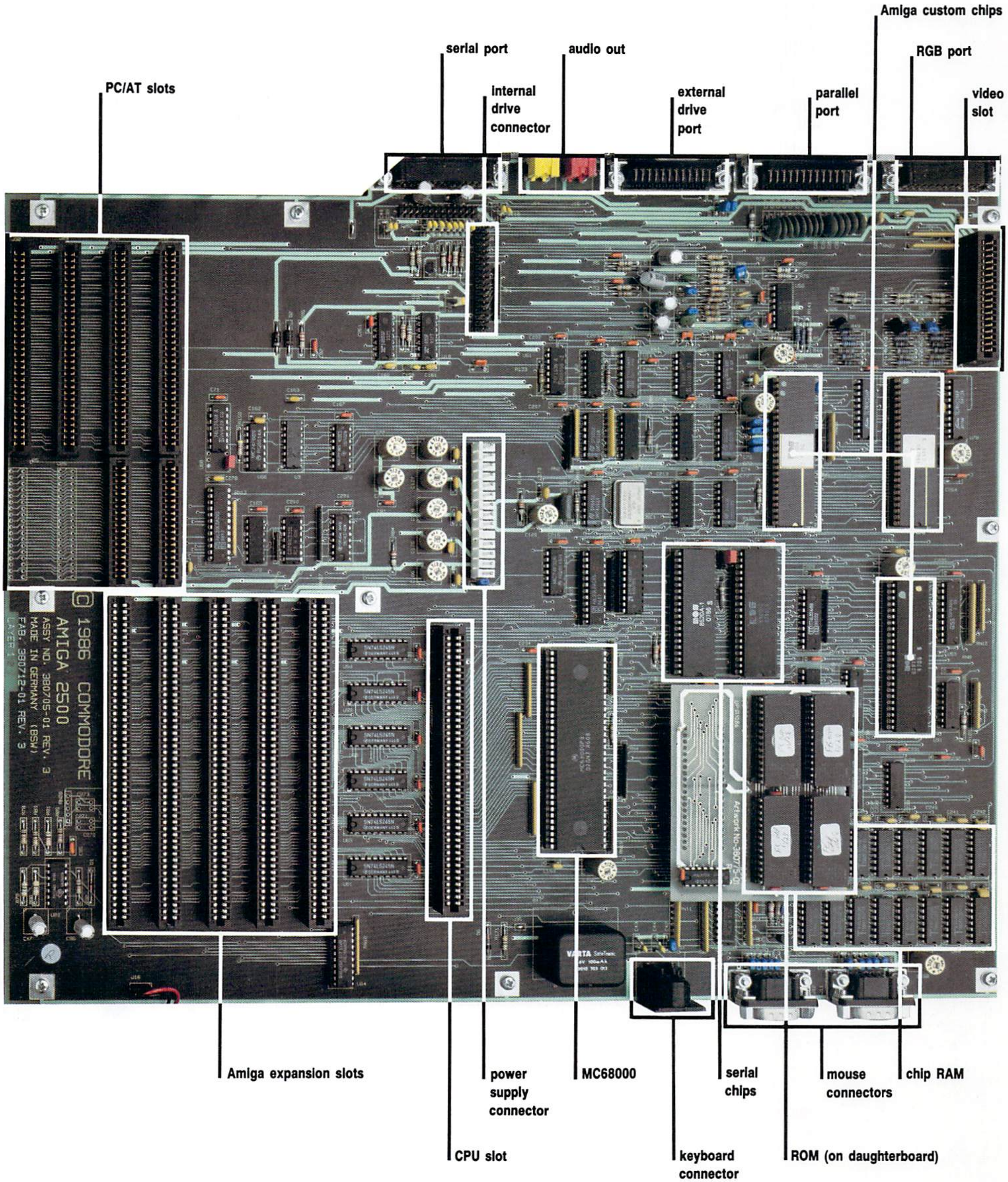
The keyboard is larger than the A1000 keyboard and the keys themselves are shallower. The keys feel springier than on the A1000—they "come back at you" faster than they do with the A1000 keyboard.

Inside the Case

Considering the number of boards and drives you can stick inside the Amiga 2000, you'd expect the machine to have a large power supply: It does. The biggest thing on the motherboard, the power supply (see Photo 2) supplies 200 watts to whatever you load into your machine. It could take a while before you overload this power supply.

Unlike the Amiga 1000, the Amiga 2000 has Kickstart in ROM, specifically Kickstart 1.2. This will save you time when you boot the system. Because the ROM chips are socketed, and because Kickstart 1.2 contains hooks to RAM-resident software patches, Amiga 2000 owners will be able to take advantage of operating system upgrades.

The Amiga 2000 comes with 1 megabyte of RAM standard. Half of that RAM is Amiga chip memory—memory accessible by both the 68000 and the Amiga custom chips. Graphics and sound data must be ►



PHOTOGRAPHED BY LARRY DUNN

Photo 5. Amiga 2000 motherboard. The mount for the power supply and internal drives normally covers the right half of the board.

in chip memory before it can be used by the system. The other 512K is fast memory; so called because the custom chips can't access this memory. The 68000 can access fast memory at full speed. AmigaDOS automatically loads programs directly into fast RAM (if there is any available) and reserves chip memory for graphics and sound. This increases the efficiency of the system.

The 512K of chip memory is built into the Amiga 2000 motherboard. The fast memory is contained on an autoconfig memory board that plugs into a 100-pin expansion slot.

The A2000 system has a built-in clock/calendar. Unlike the clock in the A1000, however, this clock has a battery backup. You will no longer have to set the time and date on powerup. One thing missing on the A2000 that is standard on the A1000 is composite video-out. Commodore has removed composite video-out from the motherboard entirely. Instead, Commodore provides a video slot that you can fill with either an NTSC coder for North America or a PAL coder for Europe. Both coder boards will be available from Commodore and will include RF signals for use with TVs and VCRs. Hopefully, the composite signal from these boards (or from third-party hardware boards) will be superior to that supplied by the A1000, which hasn't won the hearts of video professionals.

Expansion Architecture

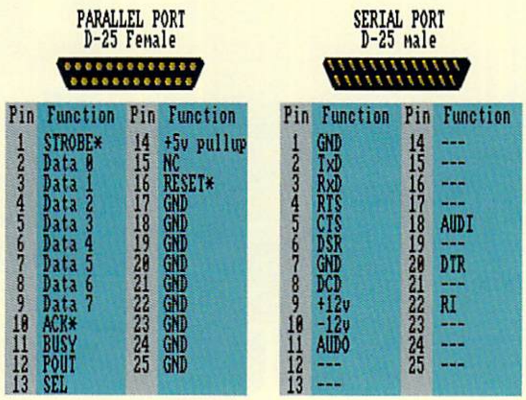
The biggest difference between the A1000 and the A2000, and the *raison d'etre* of the A2000, is the presence of slots on the A2000 motherboard (Photo 5). Commodore has made the Amiga system expandable internally, and provided as well a unique and ingenious method for running MS-DOS software on the Amiga.

Perhaps the most interesting slot on the motherboard is the CPU slot. This 86-pin slot has the same unbuffered access to the Amiga data and address busses as the MC 68000. You could use this slot to let another processor take over the Amiga or work in parallel with the 68000. This is the natural place to put a 68020/68881 board to upgrade the Amiga to a 32-bit processor.

The inclusion of the CPU slot reflects Commodore's intention to make the A2000 a multitasking, multiprocessor, multi-DOS machine. In addition to the CPU and the video slots mentioned earlier, the A2000 has five Zorro-like expansion slots on the Amiga motherboard. These slots are 100-pin, they support autoconfig, and they do have buffered access to the 68000 data and address busses; but, they are not totally compatible with the Zorro 100-pin autoconfig standard published earlier by Commodore. They conform to the *revised* Zorro specifications announced at the Monterey developers conference last fall. There are two differences: First, the form factor—the physical size and shape of the boards—is different; Zorro boards are square, A2000 boards rectangular. More importantly, some of the lines have been relocated in the slots (Figure 2). In addition to resizing, this means that some Zorro boards will have to be rewired to work in the A2000.

PC slots

The A2000 also has a four-slot IBM PC/AT bus system on the motherboard. . . sort of. Two of the slots are 16-bit AT slots; the other two are eight-bit XT slots. If you look closely at these XT slots, however, you'll see that all the lines are in place to convert these slots into AT slots (see Photo 5). All you (or your dealer or Commodore) have to do is solder the AT-specific part of the



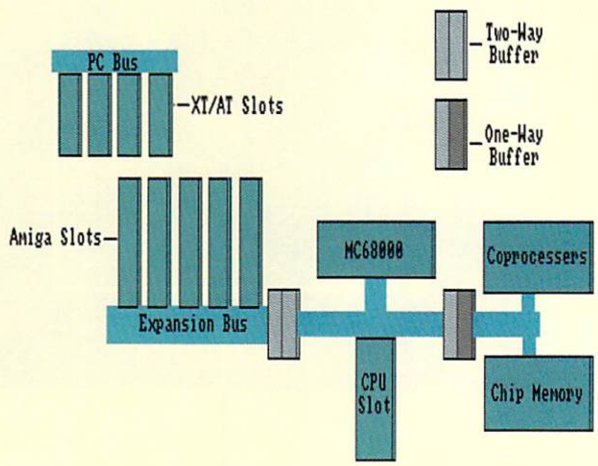
PARALLEL PORT D-25 Female

Pin	Function	Pin	Function
1	STROBE*	14	+5v pullup
2	Data 0	15	NC
3	Data 1	16	RESET*
4	Data 2	17	GND
5	Data 3	18	GND
6	Data 4	19	GND
7	Data 5	20	GND
8	Data 6	21	GND
9	Data 7	22	GND
10	ACK*	23	GND
11	BUSY	24	GND
12	POUT	25	GND
13	SEL		

SERIAL PORT D-25 male

Pin	Function	Pin	Function
1	GND	14	---
2	TxD	15	---
3	RxD	16	---
4	RTS	17	---
5	CTS	18	AUDI
6	DSR	19	---
7	GND	20	DTR
8	DCD	21	---
9	+12v	22	RI
10	-12v	23	---
11	AUDO	24	---
12	---	25	---
13	---		

Figure 1.
Pinouts of the Amiga 2000 parallel and serial ports.



Simplified block diagram of the Amiga 2000 system.

connector in place to convert the XT slots into full-fledged AT slots.

As mentioned earlier, the A2088 Board available for the Amiga 2000 provides IBM PC/XT compatibility on a board. Why, then, did Commodore provide a PC/AT bus system, two PC/AT slots, and the ability to expand the other slots to AT slots? Commodore has indicated that they plan to provide an AT-compatible board at some future date.

If this is so, then why didn't Commodore make all four slots AT compatible at once, and save themselves and users the trouble of upgrading to AT slots in the future? The problem is that, although XT cards work in AT slots, they don't always *fit* into AT slots. Many XT cards overhang so much that they don't clear the AT slot extension. To make certain that all current XT cards work in the A2000, Commodore left the extension off two of the AT slots. It's a neat solution to the problem of fitting enough Amiga, XT and AT slots into a machine that can fit easily on a desktop.

Bridging the Gap

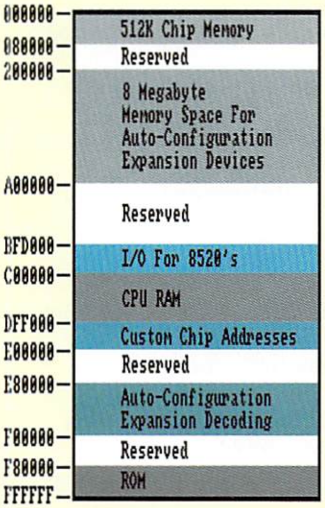
Surprisingly, the five Amiga slots and four IBM slots don't add up to nine usable slots; they add up to seven. This is due to the way the slots are laid out on the motherboard (Figure 3). Looking from the front, the four IBM slots are in the back-left of the machine. The Amiga slots are towards the front and the right. Note well, however, that the two rightmost IBM slots are *aligned* with the two leftmost Amiga slots. This alignment lets specially-constructed cards sit in an Amiga slot and a PC slot at the same time, providing a bridge between the two systems. The A2088 Board is an example of such a *bridge* card. It plugs into both an Amiga and a PC slot, thus providing a connection between the Amiga bus system and the PC/AT bus system. The connection is not achieved through physical juncture of the two busses, but rather through the sharing of memory accessible to both bus systems.

The fact that two slots of each type are aligned means increased flexibility in how you configure your Amiga 2000 system. With the A2088 Board in the leftmost Amiga slot (and the aligned IBM slot), you still have four unused Amiga slots and two unused IBM slots. If you put the A2088 Board into the next Amiga slot to the right, with the board's IBM connector in the rightmost IBM slot, you will have three unused Amiga slots and three unused IBM slots. Overlapping two slots allowed Commodore to give you great flexibility in configuring your system. Of course, if you don't install an A2088 Board, you have five unused Amiga slots at your disposal.

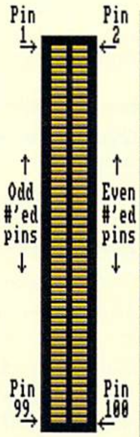
Amiga 2000 Peripheral Boards

The A2088 Board (covered in detail in the next story) and the composite video boards mentioned earlier are not the only significant peripherals available for the A2000. Commodore has two memory-expansion boards for the A2000 and a DMA hard-disk controller that supports both ST506 and SCSI (Small Computer System Interface) devices. Commodore is also offering a new high-persistence monitor for both the A1000 and the A2000. This monitor is designed to eliminate the flicker associated with using the Amiga in interlaced mode.

The two memory boards available for the Amiga 2000 use two different kinds of chips: the A2050 Two- ►



Amiga system memory map.



Pin	Function	Pin	Function	Pin	Function	Pin	Function	Pin	Function
1	GND	21	A5	41	A14	61	GND	81	BD3
2	GND	22	/EINT6	42	/EINT5	62	/BGACK	82	BD7
3	GND	23	A6	43	A15	63	BD15	83	BD4
4	GND	24	A4	44	/EINT4	64	/BGx	84	BD6
5	+5V	25	GND	45	A16	65	BD14	85	GND
6	+5V	26	A3	46	/BERR	66	/DTACK	86	BD5
7	*	27	A2	47	A17	67	BD13	87	GND
8	-5V	28	A7	48	/VPA	68	READ	88	GND
9	/SLAVEx	29	A1	49	GND	69	BD12	89	GND
10	+12V	30	A8	50	E	70	/BLDS	90	GND
11	**	31	BFC0	51	/VMA	71	BD11	91	GND
12	***	32	A9	52	A18	72	/BUDS	92	7ME
13	GND	33	BFC1	53	/RES	73	GND	93	DOE
14	/C3B	34	A10	54	A19	74	/BAS	94	/RESB
15	CDACB	35	BFC2	55	/HLT	75	BD0	95	# /BGIN
16	/C1B	36	A11	56	A20	76	BD10	96	/EINT1
17	/OVR	37	GND	57	A22	77	BD1	97	RESERV8
18	XRDY	38	A12	58	A21	78	BD9	98	RESERV9
19	/EINT2	39	A13	59	A23	79	BD2	99	GND
20	# -12V	40	/EINT7	60	/BRx	80	BD8	100	GND

* = /LOCAL-OWN ** = /CONFIG-OUTx *** = /CONFIG-INx

= updated by Amiga

Figure 2. Pinout of the Amiga 2000 100-pin expansion slots.

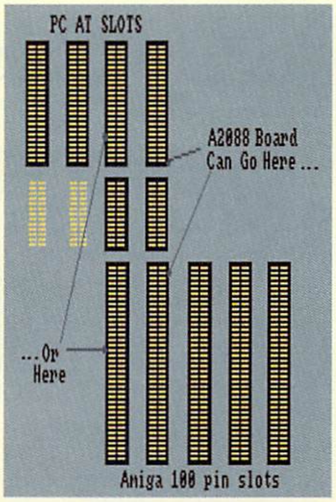


Figure 3. Layout of the expansion slots on the Amiga 2000 motherboard, indicating where you would place an A2088 or future Janus system board.

FIGURES DRAWN BY ROGER GOODE

Amiga 2000 Specifications

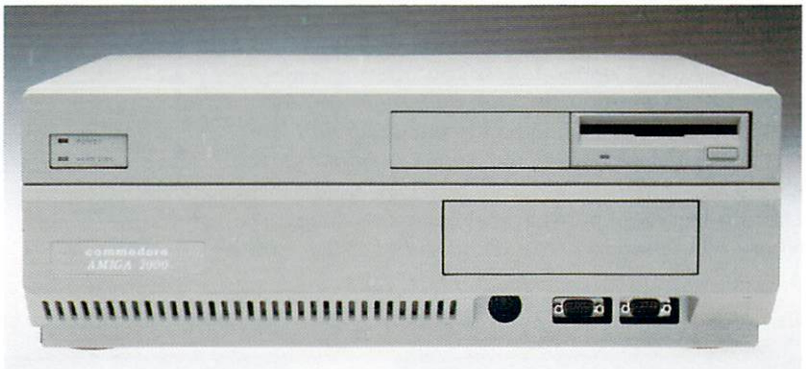
Price (preliminary)
Under $1,500

Basic System
A2000 CPU box with 200-watt power supply, keyboard, clock/calendar with battery backup and an optomechanical, two-button mouse are standard. AmigaDOS Workbench disk and Extras disk with Amiga Basic are standard software.

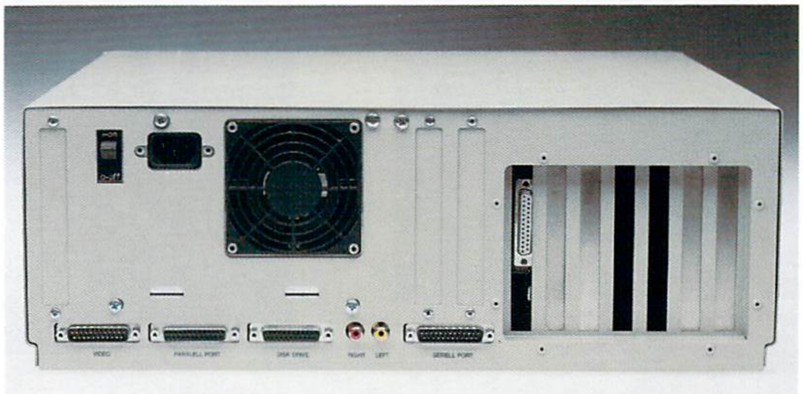
CPU
MC68000 running at 7.14 MHz. Three custom chips handle video display (graphics and animation), sound and DMA.

Standard Memory
One megabyte RAM divided into 512K chip (graphics and sound) memory and 512K fast memory. Expandable to 8.5 megabytes.

256K ROM contains operating system kernal Kickstart V1.2.



Amiga 2000 system box (front). Note the spaces reserved for the internal drives. The ports along the bottom are, from left to right, the keyboard connector, mouse port #1 and mouse port #2.



Amiga 2000 system box (rear). At far left is the cut out for the video slot. Across the top, left to right, are the power switch, power plug and fan. Across the bottom are the RGB port, parallel port, disk-drive port, stereo-audio connectors and serial port. On the far right are cut outs for connectors to boards in the seven expansion slots. Above the serial port are two more cut outs for boards that have multiple connectors.

Keyboard
Detached, 94 keys (96 on international versions). Includes 10 function keys, full cursor control and IBM-type numeric keypad. Operating system v1.2 supports different language key maps.

Disk Drives
One 3-½″ half-height floppy, built-in; 880K formatted capacity. One additional Amiga floppy drive can be controlled internally. Mounting for a third internal drive. Additional internal drives or hard disks require additional controllers.

Ports
Centronics/IBM parallel, RS-232 serial, RGB port (analog and digital), external disk drive port for two additional Amiga floppies, two audio ports and two mouse/controller ports.

Slots
86-pin CPU slot, video slot, five Amiga 100-pin expansion slots and four IBM PC/AT (16-bit) slots.

Video Display
Text:
60 or 80 columns × 25 lines; text is graphics-generated.

Graphics:
320 × 200 pixels: up to 32 out of 4,096 colors
640 × 200: up to 16 out of 4,096 colors
320 × 400: interlaced, up to 32 out of 4,096 colors
640 × 400: interlaced, up to 16 out of 4,096 colors

In each mode, the palette can be switched on the scanline (hold and modify) so all 4,096 colors can appear on screen at once.

Sound
Four independent sound channels output as two stereo channels. Each sound channel consists of an eight-bit digital/analog converter and a low-pass filter.

Optional from Commodore:

- *A2002 Color Monitor*. RGB analog, RGB digital, composite. Price not available.
- *A2080 Color Monitor* (under $500). High-persistance version of A2002.
- *A1010 External Floppy Drive*. 3-½ inch. Price not available.
- *A1020 External Floppy Drive*. 5-¼ inch. Price not available.
- *A1680 Amiga Modem*. 1200 baud, Hayes compatible. Price not available.
- *A2088 Board* (under $500). IBM PC/XT compatibility on a board, with 512K RAM.
- *A2094 Hard Disk/SCSI Controller*. Controls two ST506 drives and seven SCSI devices. Price not available.
- *A2050 Two-Megabyte RAM expansion*. Also available; 512K version. Price not available.
- *A2058 Eight-Megabyte RAM expansion*. Also available; 4M version. Price not available.
- *A2060 Video/RF Modulator Board* (under $100). Provides NTSC composite and RF out.
- *A2061 Video/RF Modulator Board* (under $100) Provides PAL composite and RF out. □



Actual unretouched photos

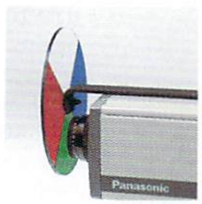
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* Digi-View software version 2.0 (or newer) required to use color camera. For maximum resolution use monochrome camera with 2.1 interlace. High-res color modes require 1 Meg expansion RAM.

Circle 102 on Reader Service card.

Megabyte Board uses 256K-bit RAM chips; the A2058 Eight-Megabyte Board uses the newer (and more expensive) 1 Mega-bit RAM chips. Both boards are autoconfig, both have zero-wait state memory, and both are available in smaller memory sizes. If you buy a board that isn't filled to capacity, you can buy chips and populate the board yourself when you need the extra memory.

Hard Disk and Scuzzy

The A2094 Hard Disk/SCSI Controller Board (Photo 3) is designed to give the Amiga high-speed access to external hard disks and SCSI (commonly called "Scuzzy") devices. The board uses a custom VLSI DMA (Direct Memory Access) controller—the 8727—to move information quickly between the board and the Amiga's memory. The board uses a Z-80 microprocessor to control a pair of ST506 hard disks. The SCSI interface is provided by the Western Digital WD33C93. This chip can be controlled by either the Z-80 or the Amiga 68000, with the default being the 68000.

The 8727 DMA controller is a Commodore custom chip that features a 64-byte FIFO (First In, First Out) real-time buffer. This buffer allows real-time data transfer between the controllers on the board and the Amiga's memory without having the DMA chip hold the system bus for an entire sector (512 bytes) transfer. Wait states caused by DMA transfer are therefore kept to a minimum.

The DMA controller uses 3 address counters accessible by the Amiga CPU to determine where to initiate data transfer (either to or from memory). Once DMA begins, these counters are incremented automatically. DMA is initiated with a 12-byte command block sent to the DMA controller by the Amiga system.

Using the DMA controller, the ST506 hard-disk interface can transfer data to the Amiga at 1.6 microseconds/byte (687K-bytes/second). Data transfer from the SCSI controller is even faster—800 nanoseconds/byte (1.25Mbytes/second). Translating these values into Mbits/second, the most common unit for expressing data-transfer rates, you find that transfer from the ST506 controller can reach 5 Mbits/second; transfer from the SCSI interface can hit 10 Mbits/second.

The SCSI interface is an ANSI X3T9.2-compatible interface that can control seven SCSI devices numbered 0 through 6. Device number 7 is the SCSI interface itself. The interface supports two connectors; an industry standard 50-pin connector and a Macintosh Plus-compatible D-25 connector. The Amiga SCSI port is thus hardware compatible with the Mac Plus SCSI port.

The ST506 controller handles one or two hard drives with up to eight recording surfaces per drive and up to 2,048 cylinders (tracks) per head. The ST506 controller doesn't support 16-head drives. The Z-80 chip that is the brains of the ST506 controller has available 2K bytes RAM to buffer commands from the Amiga. The intelligence of the controller is contained in 8K PROM (Programmable Read-Only Memory) that stores the routines that drive the Z-80, and 1K RAM for the storage of variables needed by the controlling routines.

In addition to the A2088 Board, memory boards and Hard Disk/SCSI Controller Board, Commodore and third parties are developing other peripherals for the slots in the Amiga 2000. At the nondisclosure preview provided by Commodore, they showed a Computer System Associates 68020/68881 board running in the Amiga 2000. CSA has resized their board to match the A2000 form factor; they are also making the necessary electronic changes to conform to the alterations in the Zorro electronics. Since the changes to the board weren't completed at the time of the press demonstration (early December 1986), the CSA board needed three jumpers into the CPU slot to work. With that slight modification, the board seemed to work perfectly. It computed and displayed a Mandelbrot image on the Amiga in a couple of minutes. (Note: The CSA 68020 board demonstrated goes into an expansion slot, not the CPU slot: The 68020, with a 14-MHz clock, takes control of the system simply by answering bus requests faster than the 68000 can.) Other companies are making adjustments in their Zorro boards and expansion boxes to conform to the A2000 revised-Zorro slots.

Conclusion

With the A2000, Commodore has extended the Amiga architecture to include internal slots and, optionally, IBM compatiblity, while maintaining software compatibility with the Amiga 1000. On the negative side, Commodore has failed to address the interlace flicker problem directly (although the high-persistence monitor is a big help) and has revised the Zorro expansion specification. This is bound to confuse buyers and to confound third-party hardware makers who have invested lots of time and money in supporting the Zorro standard. It is too early to tell how many manufacturers will support the A2000 expansion standard or how many may drop out of the Amiga market altogether. The third-party hardware situation will take time to sort itself out.

On the positive side, the Amiga 2000 is far superior to the A1000. In many respects, especially concerning standard memory and internal expansion, it is the machine the A1000 should have been. While maintaining software compatibility, Commodore has stretched the horizons of the Amiga architecture while giving Amiga 2000 owners a window—literally—to other processors and operating systems. With a price for the base unit of under $1,500, the Amiga 2000 is an excellent buy. Fully configured, it is perhaps the most powerful and versatile personal computer you can buy.■

Editor's note: This article and the piece on the Janus system that follows is based upon a six-hour meeting with Commodore marketing and engineering personnel, numerous follow-up phone calls and meetings, and about three days of hands-on, unsupervised experience with the A2000 and various peripherals. Due to deadline constraints, some of the information supplied by Commodore could not be verified independently. We will follow this description of the Amiga 2000 and the Janus hardware and software with further details, clarifications and corrections as needed.

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Between Two Worlds: The A2088 Board

Commodore's plug-in bridge between the world of Amiga and the world of the IBM PC.

By Bob Ryan

In the Roman pantheon, Janus was a two-faced god who guarded gates and doorways—his unique anatomical arrangement let him see in two directions at once. The Janus system incorporated into the A2088 Board (and the Amiga Sidecar) is also the guardian of a gateway: The gateway between the Amiga and the IBM PC.

The A2088 Board is a peripheral board that sits in one of the special "bridge" slots on the Amiga 2000 motherboard. The A2088 Board has two edge connectors—one connects the board to the Amiga bus system via an Amiga expansion slot; the other connects the board to the IBM/PC AT slot system. Thus, the A2088 Board contains the physical and logical link between the Amiga and the IBM world.

A2088 Hardware

More than a simple connector, the A2088 Board is a full-fledged computer system. It is an IBM PC/XT computer on a card. It has an Intel 8088 microprocessor running at 4.77 MHz, an IBM-compatible ROM BIOS (Basic Input/Output System), a floppy-disk controller for four IBM-type 5-¼" disk drives, up to 512K RAM (256K standard) for MS-DOS software and a socket for an optional 8087 math coprocessor. In addition, the A2088 Board has a custom PC Multifunction chip that emulates many of the hardware aspects of the IBM PC/XT. These include interrupt control, DMA and the generation of PC-specific timing signals. The ROM BIOS is a product of Phoenix Technologies, the leading maker of PC-compatible BIOS, and Commodore. Commodore customized the PC BIOS slightly to incorporate handshaking between the PC and the Amiga.

The A2088 Board also contains an area that is controlled by the Amiga. Two large custom chips on the board contain the Janus interface and the Amiga controller for the actual physical connections between the Amiga and the XT-on-a-board. This physical connection takes place in an area of memory common to both the PC and the Amiga; an area called the dual-port RAM.

Common Access

The A2088 Board has 128K of dual-port RAM, so called because its address and data busses are connected to both the Amiga side and the IBM side of the board (with access by one system or the other controlled by flip-flops). It is through dual-port RAM that information passes between the two systems. This is how the Amiga controls the IBM PC/XT in the A2088 Board: To the Amiga, the entire IBM PC/XT system is just another AmigaDOS application running in a window on the Amiga screen.

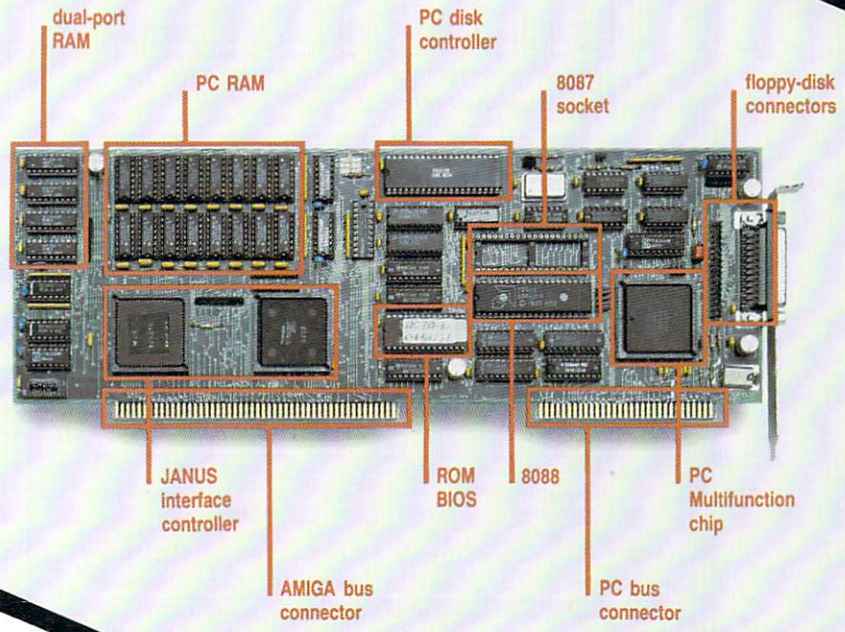
The 128K dual-port RAM is divided into three major sections. The largest is a 64K buffer used by the Amiga to transfer data between the two systems. Using this buffer, AmigaDOS can use a hard disk connected to the IBM bus system. The PC, however, can't use hard disks on the Amiga side of the system. The PC doesn't have the built-in intelligence to control the Janus interface.

The second major chunk of the dual-port RAM is critical to running IBM-PC programs in an Amiga window. In this area are the I/O registers, the monochrome video RAM, the color video RAM and the CRT registers of the PC. Also here is an eight-bit interrupt-type register that tells the Amiga what type of interrupt has occurred on the IBM side. To an application running on the IBM side, everything seems normal: The PC thinks it is writing to its screen memory and thinks it is reading its keyboard register. In fact, the PC side is writing to memory in dual-port RAM and reading a pseudo keyboard register in dual-port RAM. Once the information is in dual-port RAM, it can be accessed and massaged by the Amiga to produce output on the Amiga screen and input from the Amiga keyboard. This "massaging" function is performed by a library of routines called the janus.library. The link library for C is called jlib.lib.

Three copies of the PC registers and display memory exist in dual-port RAM; the original, as accessed by the PC side, and two "shadows" of the same information that is automatically created by the Janus controller located on the A2088 Board. These areas of shadow RAM exist because the Amiga accesses information from the IBM system in three different ways, depending upon what the information is. Sometimes, the Amiga is looking for information in byte form; sometimes in word form (the 8088 and the 68000 have a different order of bytes in their words); and sometimes as graphics information. The Janus system automatically makes three copies of the information from the PC side and then directs access of the Janus routines to the appropriate shadow RAM. (For an example of how shadowing makes life easier for the Amiga, see the sidebar entitled "How the Amiga 2000 Creates an IBM Medium-Res Display.")

The Amiga addresses the different shadow areas by applying an offset to a base address. Byte access has an offset of zero; the Amiga reads byte-sized information from the same physical locations where the PC writes it. The address of the word-access memory is offset $20000 from the byte area; graphics access is $40000 above the byte-access area. The Amiga-accessible I/O registers are offset $60000 above byte-access memory. Although very little of the possible memory between these offsets is actually used, the A2088 Board does take a big chunk of contiguous memory out of the Amiga memory map. In fact, the A2088 Board reserves two megabytes of memory for itself during the autoconfiguration process. With an A2088 Board installed, your Amiga is "limited" to 6.5 megabytes of RAM, of which only 6 megabytes can be autoconfig expansion RAM.

The third major area of dual-port RAM is called



The A2088 Board is an IBM PC/XT- compatible computer on a card.

parameter RAM. This area acts as the software interface control for the Janus system. It has some special registers that control runtime handshaking between the two systems. This handshaking is important both at powerup (see the sidebar "Two-Fisted Powerup") and while a PC application is running to keep both systems from accessing the dual-port RAM at the same time. Parameter RAM contains definitions to all the PC software interrupts that the Janus system recognizes. It also has pointers to the different data structures in other areas of the dual-port RAM.

A2088 Software

All the intelligence to control the flow of information between the PC/XT and the Amiga is on the Amiga side of the interface, either built into the A2088 Board or in the Janus library. To run PC software, the Amiga runs a task called the PCWindow task.

PCWindow is like any other Amiga program. It uses Intuition to create a resizable screen and pull-down ►

A2088 BOARD PHOTOGRAPH BY PAUL AVIS

menus, and it only goes into action when its polling procedure detects an action that requires its attention. Like other Amiga tasks, this action could be the user clicking the mouse. Unlike common Amiga tasks, however, PCWindow must also respond to what is happening on the PC side of the A2088 Board and take action when needed (specifically, when the PC changes its display screen or reads its keyboard). Optionally, you can have the PC control the Amiga parallel port.

When an IBM-PC program changes the information it is displaying on the screen, it writes the new information to a specific area of memory. In a PC, a video processor scans this memory and uses the data there to update the screen. When a PC program running on the A2088 Board writes to screen memory (located in dual-port RAM), it triggers a level 2 interrupt on the Amiga side. The PCWindow task then checks the interrupt-type register in dual-port RAM to see what caused the interrupt. (The PC will interrupt the Amiga when one of eight conditions occurs: The PC reads the keyboard, writes to monochrome video RAM, writes to color video RAM, accesses the monochrome CRT registers, accesses the color CRT registers, accesses LPT1, accesses COM1, or experiences a software interrupt.) If the interrupt is something the Amiga must handle, it does; otherwise, it ignores the interrupt.

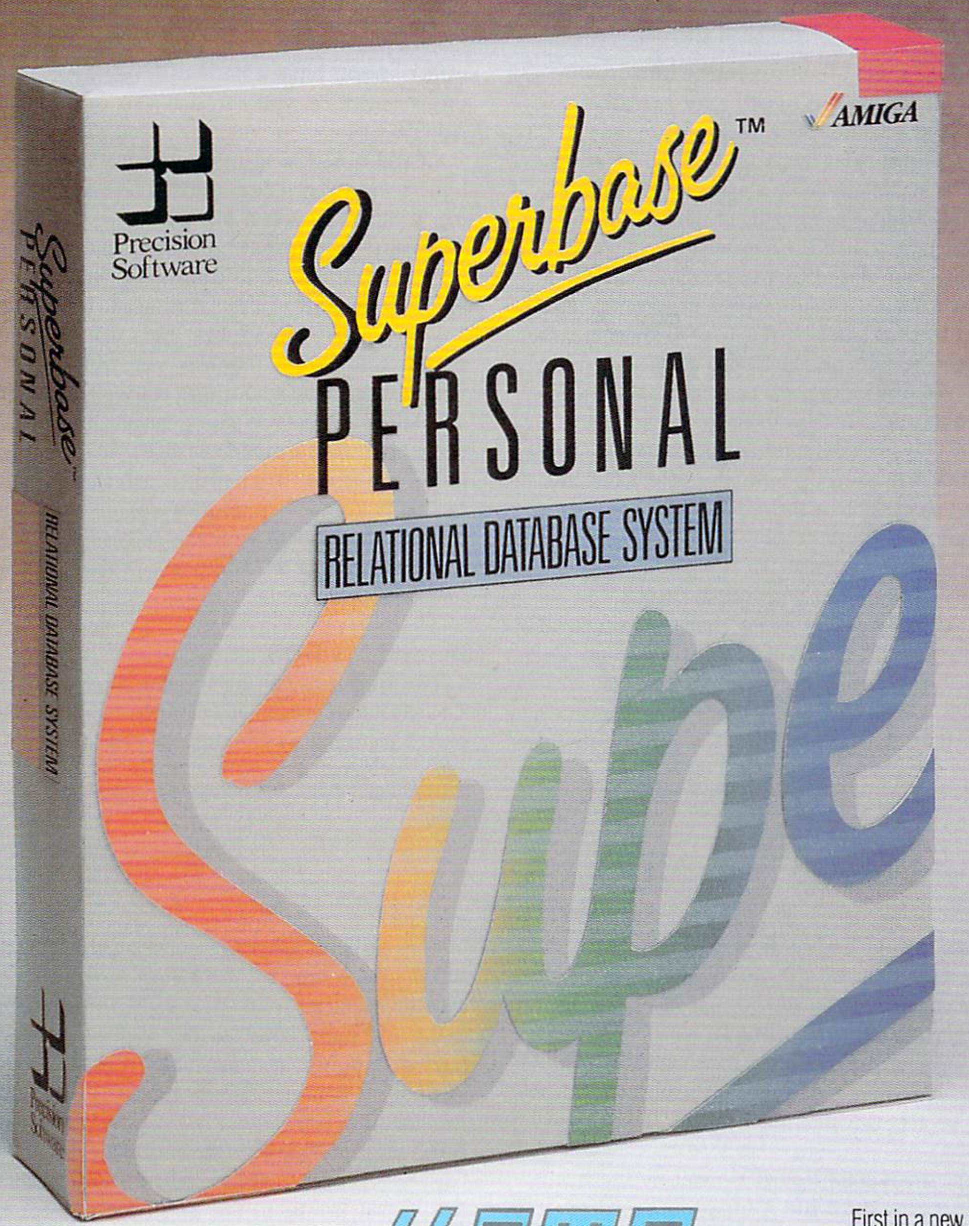
In the above example, where the interrupt is triggered by the PC writing to its screen memory, the PCWindow task can't ignore the interrupt since it needs to keep its window current with what's happening inside the PC. The PCWindow task checks the PC display memory in dual-port RAM against a copy of this memory that it keeps in Amiga memory. If a change has occurred, PCwindow updates its output window to reflect the change on the IBM side. It also updates its copy of the IBM screen memory. Going the other way, when the PC is looking for keyboard input, it sends an interrupt to the Amiga. PCWindow handles the interrupt and passes a character along to the PC side (in PC-keyboard-specific serial form) after reading the Amiga keyboard. Then, via an interrupt to the PC side, PCWindows tells the PC that it has completed transferring the character. Then, both computers go on their merry ways until the PC application again changes its screen memory or asks for keyboard entry.

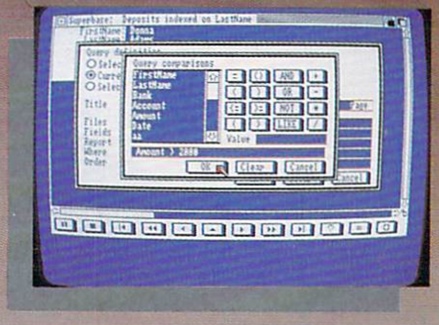
PC Operations

The Amiga software that comes with the A2088 Board contains the Janus library and allows you to run MS-DOS programs in either monochrome or color-graphics mode. MS-DOS programs come up in an Amiga window that you can resize like any window. You can also eliminate the border around the window and change the default colors.

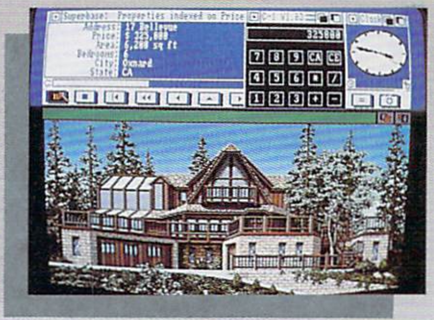
PC programs in text mode update the Amiga window a little slower than they would a PC screen. Many times, the Amiga will scroll two or three lines at a time to keep up with the PC program. Graphics applications on the A2088 Board are not appreciably slowed by having the display routed through an Amiga window.

The A2088 Board comes with both Amiga and PC ▶









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utilities. On the Amiga side, it comes with software that allows you to let the A2088 Board take exclusive control of the Amiga parallel port. In addition, you get a Preferences program that lets you determine which areas of the PC ROM space you want to include in dual-port RAM. Some PC graphics boards, such as the Hercules color board, use the same ROM space as the IBM CGA that is emulated by the Janus system. The Hercules board, however, supports a horizontal resolution (720 pixels) that can't be duplicated by the Amiga, which is limited to 640 pixels. If you plug a Hercules card into the AT bus system on the Amiga, you'll have to use the PC Preferences program to turn off the emulation of PC ROM area $B8000 in the dual-port RAM. This area is the one used by both the IBM CGA and the Hercules board. You will then have to hook up a separate monitor to the Hercules board to see the Hercules display.

The A2088 Board comes with MS DOS 3.2. On the disk, you get a utility called Adisk that lets you format a partition on an MS-DOS disk under AmigaDOS. Then, using the Djmount command from AmigaDOS, you can get AmigaDOS to recognize and use the partition on the MS-DOS disk, even when MS DOS isn't booted. In effect, if you have a hard disk on the IBM side of the Janus interface, you can use part of it under AmigaDOS.

At the time I saw the A2088 Board, Commodore hadn't finalized a file-transfer technique for moving information between MS DOS and AmigaDOS. Two techniques are under consideration. One is to pass an MS-DOS pathname to the A2088 Board under AmigaDOS and to then intercept the result of the action that MS-DOS takes. This will only work if there are no concurrent requests for MS DOS by the PC system. The second technique under consideration is to emulate the MS-DOS filing system in an AmigaDOS task. This would make the file-transfer program rather large, but it could let you transfer data without having MS DOS active. Commodore promises some type of file-transfer system with the release of the A2088 Board, in addition to a cut-and-paste function between Amiga and PC windows.

Beyond MS DOS

The important thing to remember about the A2088 Board is that it isn't necessary to run MS DOS on the board to make use of the 8088 processor. At the pre- ►

Two-Fisted Powerup

When power is supplied to an Amiga 2000 system that contains an A2088 Board, the sequence of events is carefully choreographed by the Amiga to ensure that the PC is brought under the Amiga's control. Understanding the powerup procedure is important in understanding how the Amiga interacts with the PC and how AmigaDOS can access a partition on the IBM side of the system.

At powerup, the A2088 Board is reset by the Amiga and it stays that way until the Amiga has executed Binddrivers, loaded janus.library, and loaded Workbench. The Amiga then releases the PC from reset and waits. When reset is released, the PC starts its powerup procedure. The Amiga knows that PC powerup is complete when it detects memory refresh on the PC side. At this point, the PC BIOS begins to poll a special location in dual-port RAM for permission to procede. This polling procedure is one of the modifications that Commodore made to the Phoenix PC BIOS ROM.

Having detected memory refresh on the PC side, and knowing that the PC is in a wait state, the Amiga then downloads the file PC.Boot into the $E0000 page of PC memory in dual-port RAM. The PC.Boot file contains the PC side of an AmigaDOS hard-disk driver. Once the Amiga has installed its driver in the PC ROM, it sends a signal to the PC to procede with its boot process. The Amiga then waits for confirmation that booting is complete.

When the PC receives the signal from the Amiga, it continues with its boot procedure by initiating its ROM search. In a PC, the programs that drive peripheral boards are contained in ROM on the board. During ROM search, the PC incorporates these ROM routines into its memory map, starting with the lowest ROM address and proceeding to the highest. In an IBM system, hard-disk controllers normally reside at location $C8000 in memory. When the PC ROM search reaches this location, it triggers the execution of an initialization routine. This routine modifies the vector for interrupt $13, which is triggered by a disk access. Normally, this vector points to the BIOS services for floppy-disk drives. The hard-disk initialization routine at $C8000 modifies the vector so that it points to the hard-disk controller located just above the initialization routine.

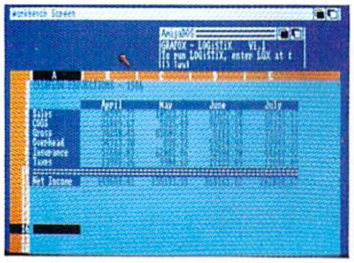
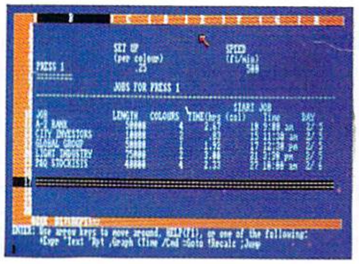
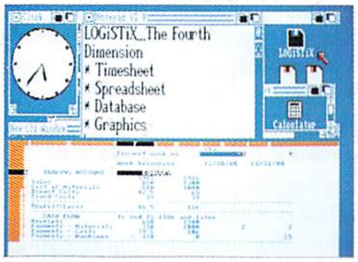
As the PC ROM search continues, it encounters the code at $E0000 that was placed there by the Amiga while the PC was in a wait state. This code modifies the vector for interrupt $13 once again, so that it points to a place above $E0000. Thus, since the Amiga code above $E0000 is the first invoked by a request for disk services on the PC side, the Amiga can redirect the results of disk access from the PC to the 64K buffer in dual-port RAM. The Amiga can even initiate disk services by sending an interrupt $13 to the PC side. This is how AmigaDOS controls disk hardware on the PC side of the A2088 Board.

Once the initialization routine at $E0000 is finished, it sends a signal to the Amiga confirming that the PC ROM search is done. The PC is now ready to run MS DOS, and the Amiga is ready to access the PC through an Amiga window. The two systems are ready to get to work.□

LOGiSTiX

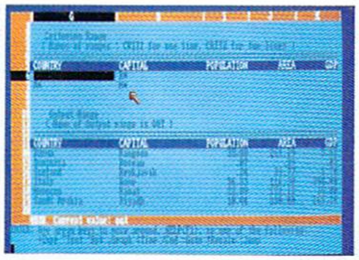
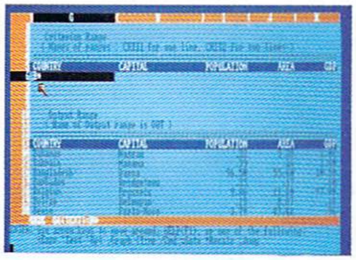
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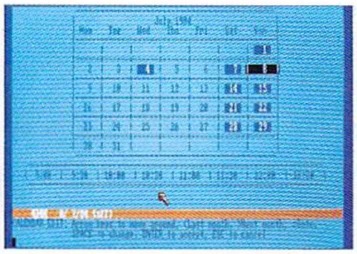
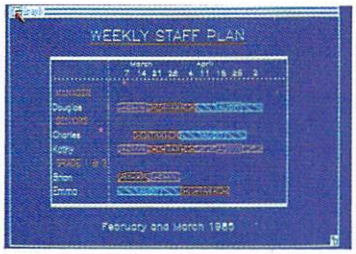


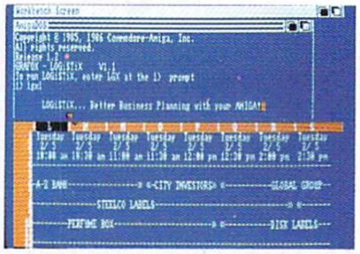
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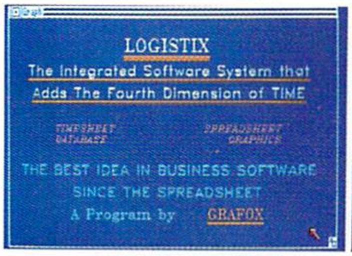

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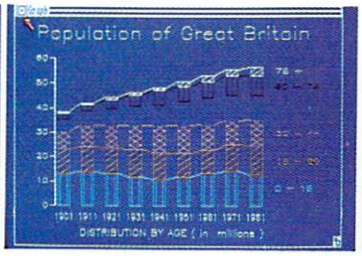
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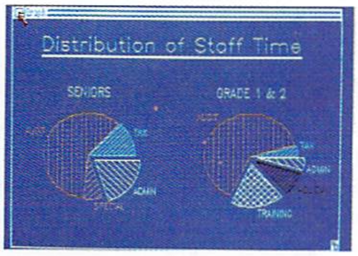






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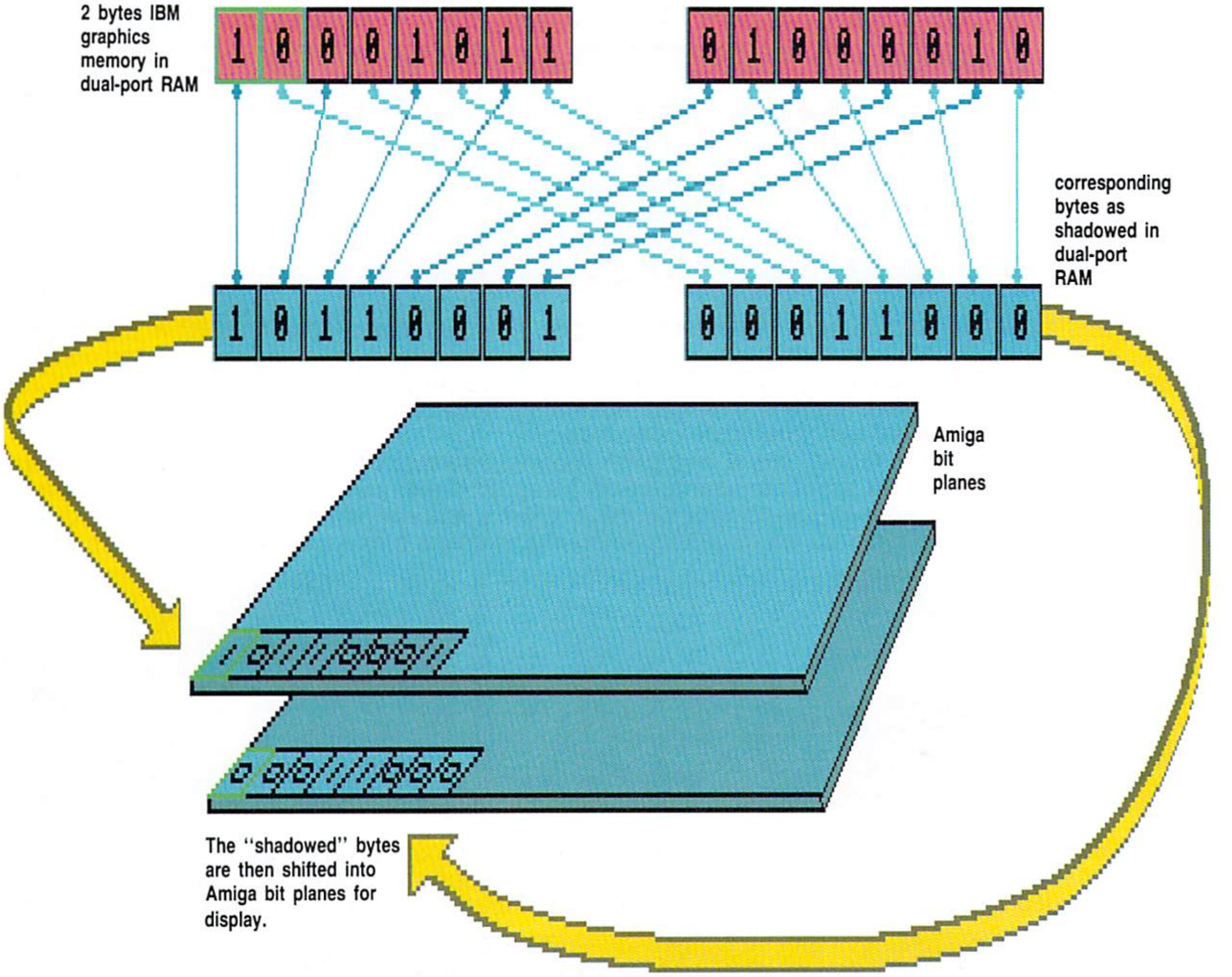
Circle 160 on Reader Service card.

How the Amiga Creates An IBM Medium-Res Display

The screen memory of an IBM medium-res display stores four pixels per byte. Each pixel is defined by two bits and can therefore have one of four different values. These four values correspond to the four colors a pixel can have in an IBM medium-res color display.

When an IBM program running on the A2088 Board writes to screen memory in dual-port RAM, the information is immediately shadowed to the graphics-access area in dual-port RAM. The shadowing procedure is not a straight copy, however: There's some hard-wired processing going on that makes it easy for the Amiga to transform PC pixel-packed graphics information into Amiga bit planes.

The shadowing process takes information from two bytes of PC screen memory and sends alternate bits to two different Amiga bytes. The odd-numbered bits from the PC bytes go to one Amiga byte and the even-numbered bits go to the other. This automatic process doesn't require the 68000 or the 8088. When the Amiga creates an IBM graphics display, it shifts the odd-numbered byte (containing the odd-numbered bits) into one bit plane and the even-numbered byte (with the even-numbered bits) into the second bit plane. The shadowing process unpacks the IBM graphics information; the only work the 68000 has to do is shift the unpacked information into the bit planes. □



view, a Commodore engineer described a system whereby the PC system is used as a real-time data aquisition system and preprocessor for the Amiga. Using the public routines of the Janus library, it won't be too difficult to develop custom applications that use the combined power of the 8088 and the 68000. The A2088 Board is not merely "MS DOS in a window." The Amiga 2000 with the A2088 Board gives you flexibility not seen before in a microcomputer coprocessor system. ■

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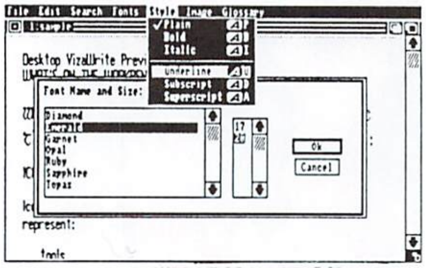
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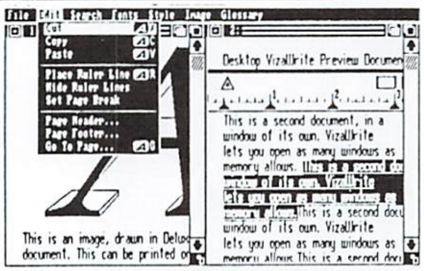


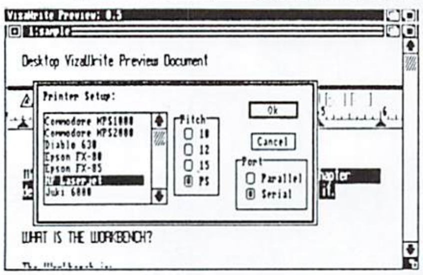
Figure 1.0

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ILLUSTRATED BY VINOY LAUGHNER

Graphic Hardcopy And the Amiga

By Morton A. Kevelson



INSET:

A screen dump made using Grabbit and a Canon PJ1080A.

LEFT:

The same image printed from Aegis Images at 640 wide × 800 high on the Canon PJ1080A.

No matter how impressive an original Amiga screen display is, I have yet to see one that can be slipped into my portfolio or folded into a letter-size envelope. For these applications, and many others, a quality graphic printout is indispensable. The developers of the Amiga's operating system anticipated this need by including a generic printer device (PRT:). On most computers, it is up to the applications programmer to create printer drivers for each package; the Amiga includes these drivers as part of its operating system. The applications programmer need only follow the Amiga's rules on printer control while the end user simply selects the appropriate printer driver with Preferences.

The Amiga's printer drivers are not just simple text routines. Full graphics capabilities have been included for the dot-matrix printers, which have the ability to print bit-map graphics. Even color graphic printers are supported. As a result, an Amiga fresh out of the box has so much graphic printing potential that it takes many hours to discover just what is available. Version 1.2 of the operating system (which is starting to ship as of this writing) even includes a graphic screen-dump utility right on the distribution disk.

This article is intended to shorten the process of discovering the Amiga's graphic printing capabilities. It presents the results of many hours of experimentation with several printers, some popular graphics packages and some stand-alone screen-dump programs.

Preferences

With very few exceptions, the graphic screen printer-dump parameters will be controlled entirely with the Amiga's Preferences tool. Two of the three Preferences screens are devoted entirely to printer settings. The second screen, accessed by clicking on the Change Printer box, deals primarily with the hardware aspects of the printer. However, the margin and page-length settings on this screen may be used to to control the size of the graphics dump.

The width of the printed image is set by the difference between the right and left margins. Note that this is a relative setting, since the graphic dump always starts at the left edge of the paper. The width of the dump automatically determines its height. The aspect ratio (width divided by height) of the graphic printout is fixed by the characteristics of the printer and its printer driver. It is also possible to set the dump size by adjusting the page-length parameter. However, the fixed aspect ratio will still prevail. Thus, the smaller of the two settings, and the aspect ratio, will determine the size of the printout.

The real fun to be had with graphic dumps is found on the third Preferences screen. This may be reached by clicking on the Graphic Select box in screen two. On this screen take note of the three types of graphic dumps that are available under the Shade category. The Black-and-White option generates a high-contrast dump with screen colors printed as either pure black or pure white. This mode works in conjunction with the Threshold scale at the top of this screen. An understanding of how the Amiga generates its display colors will be helpful in applying the Threshold setting.

The Amiga Color Display

Each of the Amiga's 4,096 colors is composed of a mixture of red, blue and green primary colors, which correspond to the color phosphors of the video display. Each of the primary colors can be set at one of 16 intensity levels (hence the 4,096 possible combinations). Note that an intensity of zero is equivalent to black, or turning off that color entirely. Internally, the Amiga stores a color value in a 12-bit register with four bits devoted to each primary color. The Amiga's custom graphics chip has 32 of these registers, which define the maximum number of different colors on the lo-res screen under normal circumstances.

The relationship between the color values and the threshold scale should now be obvious. For a given setting, eight for example, all colors with a combined intensity that is less than this value print as black. All lighter shades print as white. This relationship holds firm for shades of gray where the red, blue and green are set to the same level. It seems to also hold fairly well for the average value when the primary-colors settings are not all the same. However, I have noticed some anomalies: Using a threshold setting of eight, on a color consisting of 15 red, 0 green and 0 blue prints as black, while 0 red, 15 green and 0 blue prints as white. This corresponds to the maximum sensitivity of the eye to the green portion of the spectrum. ►



The Gray Scale option is exactly as the name implies. The display colors are translated into shades of gray by printing various patterns of black dots. The total number of possible patterns is of course limited by the printer's dot size and the number of pixels composing the screen image. For example, a four-by-four printer pattern may be made to correspond to a single screen pixel. Although this allows for 65,536 possible dot patterns, on the average only 16 unique shades of gray are actually possible. Some additional shading may be obtained by the arrangement of the dots in the matrix. The remaining patterns are merely different arrangements of dots whose differences may be discerned at the pattern boundaries. For example, color 15 red, 7 green and 0 blue (an intense orange) generates the same gray pattern as 0 red, 15 green and 0 blue (pure green) on my Canon PJ1080A and Okidata ML92 printers.

Both the Black-and-White and Gray Scale options may be used with color as well as black-ribbon printers. Note that color printers should use only their black ribbon or ink pack with these modes. If you have an Okimate 20, you will have to make sure that the black-ribbon cartridge is in place.

If you have a color printer, the Color setting will let you produce color-graphic dumps. With *very few* exceptions, do not expect to see the same results on paper as you see on the screen. Printer technology is just not up to the wide range of colors available on the video display tube. Pleasing and useful results are still attainable; however, "serious" applications will demand some experimentation on your part. One approach is to set up test patterns of calibrated colors. Of course, trying out all possible 4,096 colors is quite a project. At 32 colors per screen you will need 128 dumps for a complete selection. Nevertheless, useful results can be obtained from far fewer trials.

Of the remaining settings, one lets you choose between a horizontal or vertical printout. The latter setting will let you make a larger dump than the former. Note that the aspect ratio of the horizontal dump may differ from that of the vertical dump. The last setting applies only to black-and-white or gray-scale graphics dumps. This setting lets you invert the printed relationship between light and dark screen colors. Just click on the Positive box for a dump that corresponds to the screen display. Clicking on the Negative box will generate a photographic inverse of the screen on the printer.

Of course, the Preferences settings may be changed as often as you like. And make sure, when you first customize Preferences to your most used mode and printer, you select the Save option upon exiting if you want to store the settings on the Workbench disk. Clicking on the Use box on the first screen is adequate to make temporary changes.

Setting the Palette

Every paint program has some means for changing colors. In the course of preparing this report, I examined the three most popular Amiga paint programs and noted some differences in their color-setting procedures.

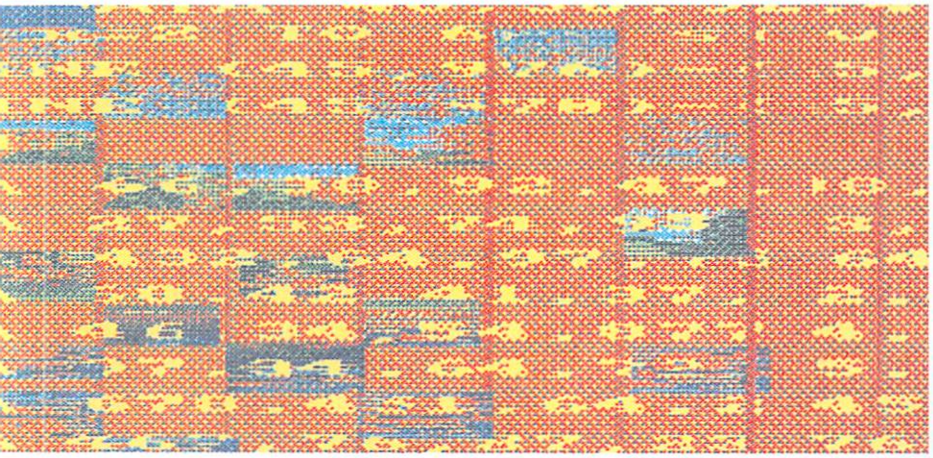
Aegis Images has a color-palette control that is well suited to the type of experimentation described above. Three sliders with numerical settings from 1–15 are displayed, which may be set to control either red, green and blue or hue, luminance and shade. The red, green and blue slider combination is preferred for calibrating the color palette. The numerical settings make it very easy to set up and repeat calibrated colors for experimentation.

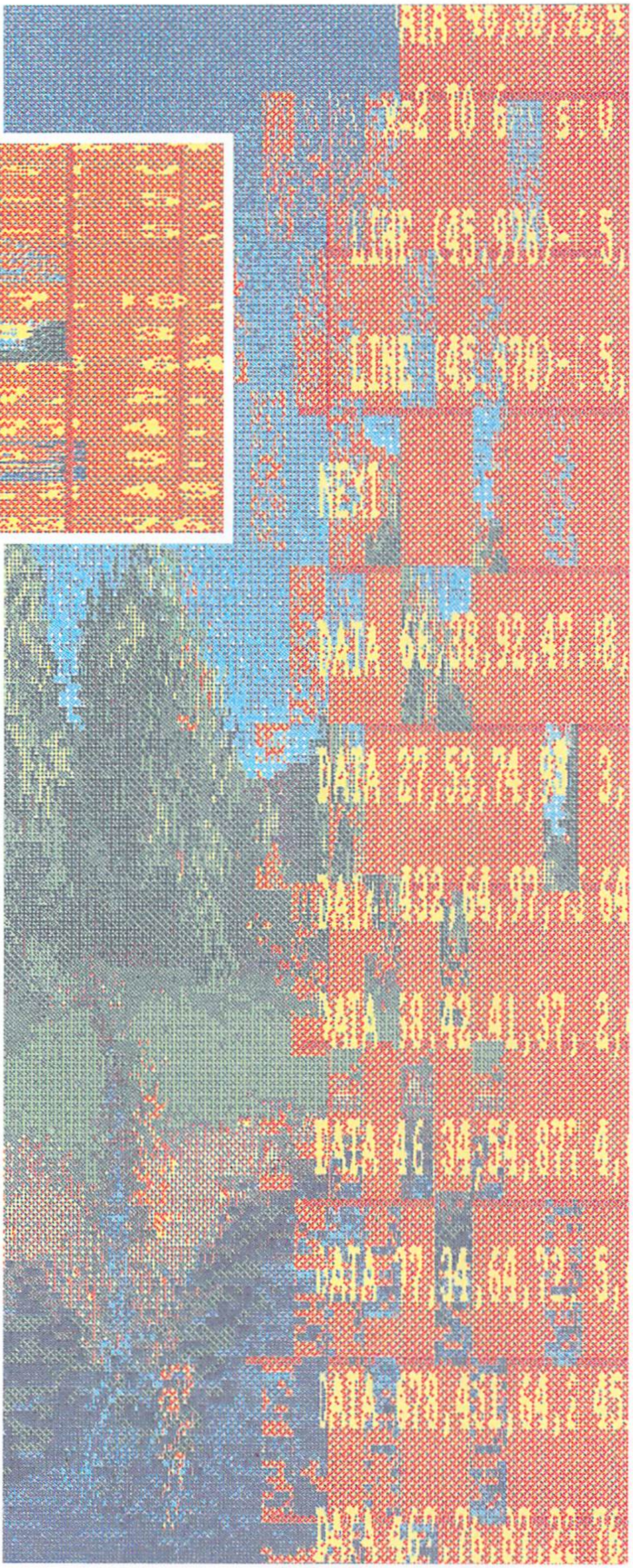
DeluxePaint's palette control is also easy to work with. Six sliders for red, green, blue, hue, saturation and value are simultaneously displayed. The three color sliders have tick marks for all sixteen color steps with numerical markings every four steps. Changes in the red, green or blue sliders are immediately reflected in the settings of the hue, saturation and value sliders and

RIGHT: *A Canon PJ1080A printout from DeluxePaint at 320 wide × 800 high.*

INSET: *The same image printed on the Canon PJ1080A at 1,024 wide × 200 high using the Preferences Vertical setting.*

ILLUSTRATED BY ROGER GOODE





vice versa. The arrangement is well suited for setting up calibrated colors.

Commodore's Graphicraft also uses red, green and blue sliders for setting the colors. However, these controls lack any visible calibration. To make matters worse, dragging the sliders results in more than 16 possible positions for each slider. I did find that clicking in the space next to the slider changed the setting in 15 discrete intervals. To repeat a setting it is necessary to count the mouse clicks as the slider is stepped along.

Graphic Dumps from Paint Programs

All of the graphic packages mentioned above include built-in graphic dumps that can be controlled by Preferences. Aegis Images 1.2 includes a useful refinement to the margin settings with its graphic screen dump. Images lets you specify the width and height of the printed image in pixels, instead of using the margin settings in Preferences. This feature lets you exercise precise control of the dimensions and aspect ratio of the graphic printer dump.

The range of Aegis Images' printer control is 320–1200 pixels horizontally × 200–800 pixels vertically. These values apply to the screen orientation of the image and not the Horizontal or Vertical printout selection in Preferences. For example, a dump 640 pixels wide × 200 high in Images will print as a horizontal or vertical strip depending on the setting in Preferences.

The actual usable range of Aegis Images' printer controls will depend on the number of dots per line the printer can generate. For example, the Okimate 20 will work with up to 920 pixels across the page while the Canon PJ1080A is limited to 640. The length of a vertical printout is essentially unlimited. A vertical aspect in Preferences will permit the entire 1200-pixel width to be used with any printer. With Images, if you try a dump with more than the possible number of pixels, it simply refuses to print. No indication is given when this happens; this is a bit frustrating, since it ►





OPPOSITE PAGE:

An Okimate 20 printout from DeluxePaint at 640 wide × 602 high.

ABOVE:

The same image printed in gray scale on an Okimate 20 at 957 wide × 800 high.

RIGHT:

The same image printed in gray scale on an Okimate ML92 printer at a threshold of 8.

ILLUSTRATED BY ROGER GOODE

normally takes several seconds for a color dump to get started.

Commercial Graphics Utilities

In addition to the screen dumps that are built into the graphic packages, stand-alone screen-dump utilities are available both commercially and in the public domain. One of the most versatile of these programs that I have come across is Grabbit from Discovery Software. Once activated, this program stashes itself in some out of the way place in RAM. Its presence is not felt until invoked by the proper "HotKey" sequence. Grabbit can be used to generate a graphic printer dump of any screen image that is displayed by any program. The only requirement is that the program whose screen is to be dumped should follow the protocols that are set forth in the Amiga's ROM Kernel Reference Manual. Included on the Grabbit disk is a very useful palette-adjustment utility called AnyTime. When activated, AnyTime displays a color palette that is very similar to the ones generated by the dedicated drawing programs. This is a very handy way to fiddle with the shading of a black-and-white or color graphic dump prior to printing.

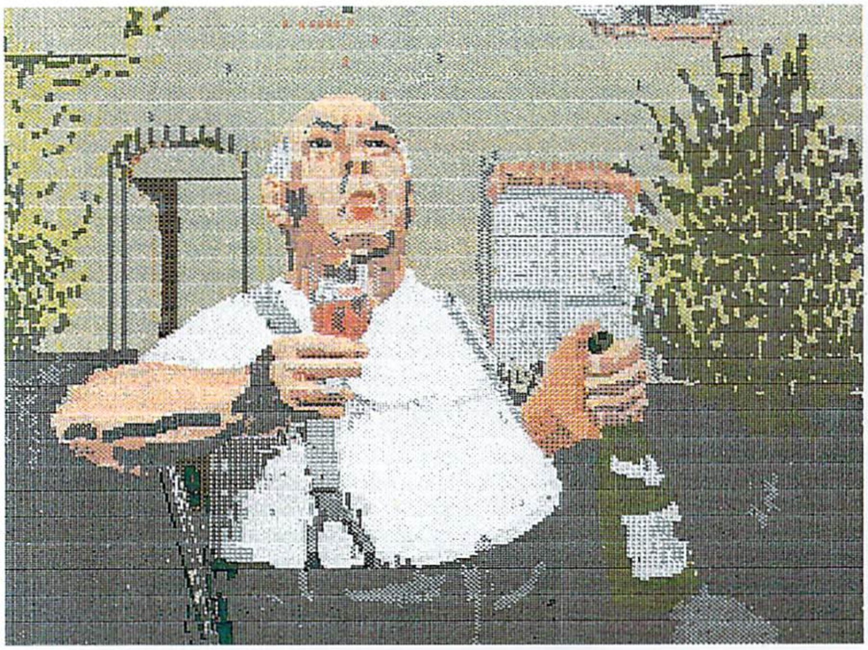
From Electronic Arts, the DeluxePaint Art & Utility Disk Volume 1 contains a number of useful items. Among these is the PrintUtility written by Perry Kivolowitz. This program opens its own minimum height Workbench window to allow for Amiga protocol menus. When activated, PrintUtility will let you cycle through the available screens and pick one for printing. All the Preferences printer controls are available with the exception of the vertical aspect option.

When a screen is selected for printing, PrintUtility looks for enough empty RAM to put it in. If RAM is available, the screen will be copied to it and printed in the background. Otherwise, you are informed of the lack of space and asked to pick direct printing. PrintUtility will also let you print images and text files straight from disk. For images, the barest minimum of memory is used, since only a single line of graphics is read in at a time. This is the reason for the restriction to horizontal aspect dumps. Also on the Utility Disk is a comprehensive slide-show program and the public domain SeeILBM utility. The latter lets you conveniently view individual IFF images without loading up a complete graphics package. The SeeILBM program, used in conjunction with PrintUtility or Grabbit, is a very convenient way to view and print a series of graphic images.

Public Domain Graphic Utilities

Commercial software is not the only source of graphic utilities. Many useful programs may also be found as shareware or in the public domain. A good source of public-domain software is Fred Fish (345 Scottsdale Road, Pleasant Hill, CA 94523). Mr. Fish has single-handedly undertaken the task of compiling a massive public-domain program library for the Amiga. As of this writing, the count is up to disk 35.

I have already come across two graphic screen-dump programs in the non-commercial sector. Scrimper, for SCReen IMage PrintER, is the predecessor to the Electronic Arts PrintUtility. Scrimper will not print an image from disk; nevertheless, it is well worth the price. Scrimper may be found on Fish disk number 18.



ScreenDump is a shareware offering from Ned Konz (210 Oleeta Street, Ormand Beach, FL 32074). If you find that ScreenDump satisfies your needs, then Mr. Konz requests a minimum donation of $10 to further his efforts.

Conclusion and Comment

The proliferation of graphic and print utilities, so early in the Amiga's life-cycle, is a fitting tribute to its capabilities. All indications are that the selection will continue to grow for the forseeable future.

While I hate to conclude on a sour note, I feel that this may be an occasion where it may do some good. Although the Amiga's printer routines produce satisfying results, their speed leaves something to be desired. Anyone who has actually done a graphic screen dump will recall the anxiety associated with their first attempt. The Amiga seems to go off to some inner limbo for an extraordinary long delay before printing starts. Color graphic dumps are always accompanied by pregnant pauses that punctuate each pass of the printhead.

The fault seems to lie entirely in the Amiga's printer routines and not with the application software. Rumor has it that Commodore is well aware of the problem, but has declined to fix it as, to date, no one has complained. Well, for the record, here is my official complaint! Slow printing, on a machine with the Amiga's capabilities, is a shame and a disgrace. So, go to it Commodore, fix those printer routines! ■

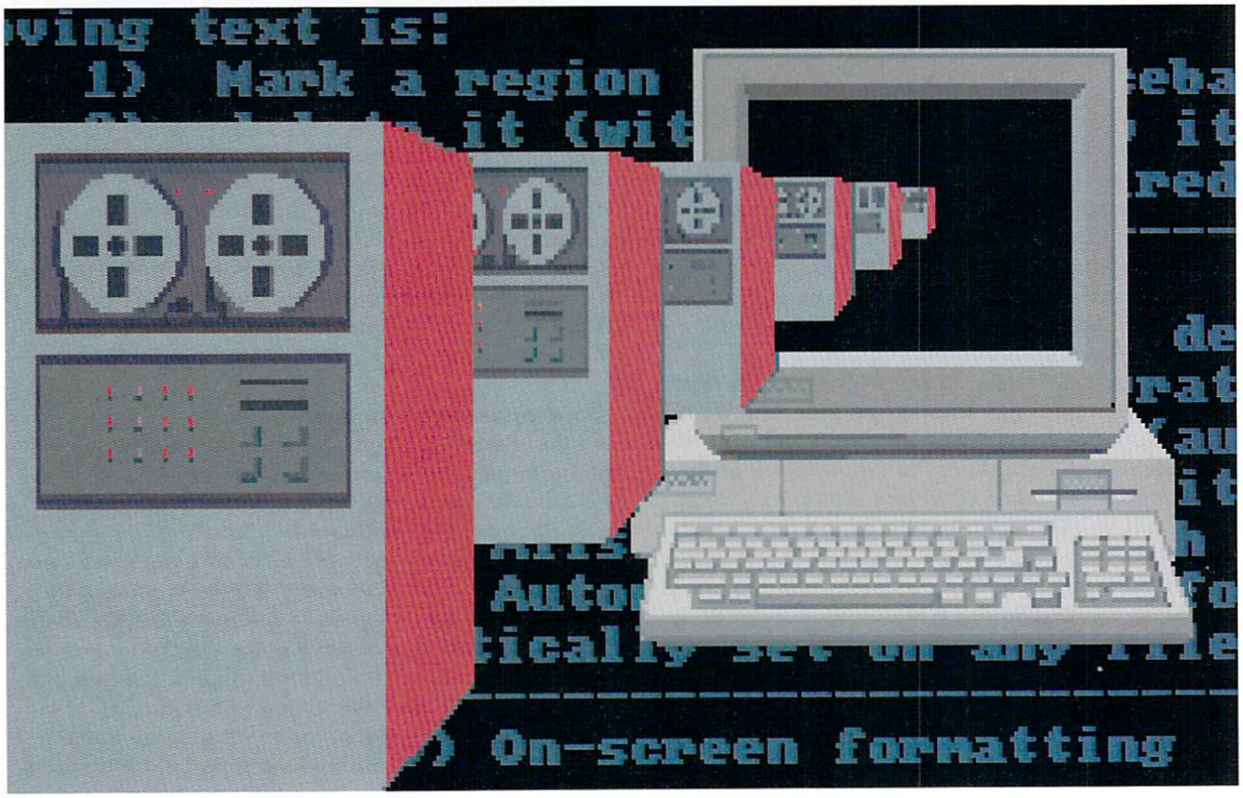
Address all author correspondence to Morton Kevelson, 2471 Bragg St., Brooklyn, NY 11235.

Absoft's AC/FORTRAN

A review of Absoft Corporation's

FORTRAN compiler for the Amiga.

By William B. Catchings and Mark L. Van Name



The combination of FORTRAN and the Amiga, the old and the new, may seem an unlikely one. But, for many Amiga users, Absoft's AC/FORTRAN version 2.2 could become one of their most valued tools.

The Amiga FORTRAN compiler is based on a core system that is already available on other microcomputers, including the Macintosh (as Microsoft FORTRAN), the Atari ST and the Hewlett-Packard Integral PC. Absoft also offers FORTRAN/020, a version of the compiler tailored specifically to take advantage of the CSA 68020/68881 Turbo Amiga Board.

Many large scientific laboratories do much of their programming in FORTRAN. They are faced with problems that the Amiga can help to solve, such as graphical ►

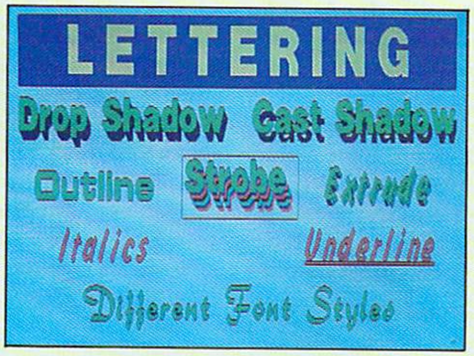
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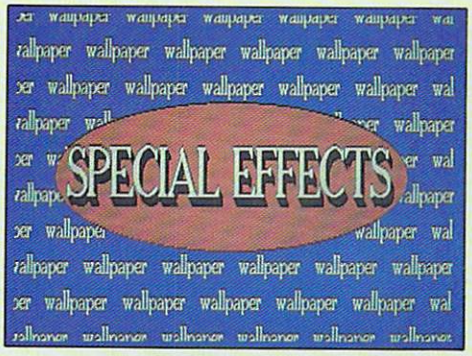
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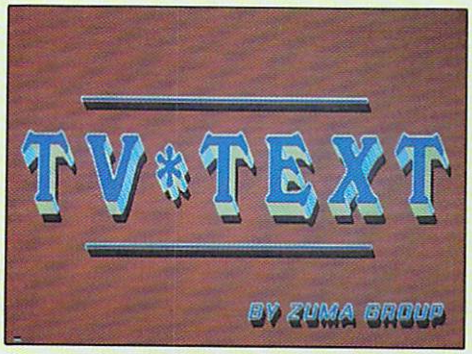
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data presentation. Imagine, for example, a large central computer doing a great deal of number processing, with the results being turned into graphic images and displayed on Amigas. The powerful computational and graphics capabilities of the Amiga can remove the image-generation work from the central machine, freeing it to concentrate on the computational chores.

To do this, the Amiga needs to process a dialect of FORTRAN very close to that in use on the larger machine, while offering reasonable performance. The Absoft compiler, while by no means perfect, fulfills both of these needs.

FORTRAN 77

FORTRAN, short for FORmula TRANslation, is a programming language that first appeared in the 1950s. It was designed to solve highly mathematical problems. Despite its age, FORTRAN is still extensively used.

In 1966, the ANSI FORTRAN standard was ratified; it is commonly known as FORTRAN IV or FORTRAN 66. Because its structure and basic capabilities fell behind those of newer high-level languages, it was revised about a decade later as FORTRAN 77.

AC/FORTRAN is an almost complete version of FORTRAN 77. Our testing revealed no areas of incompatibility beyond those mentioned in Appendix I of the manual. Of the six restrictions cited there, we feel that only three might interfere with normal work:

1. While you can declare eight- and 16-bit integer (INTEGER*1 and INTEGER*2) variables, you cannot have constants in these sizes. It is not even possible to pass a one- or two-byte integer constant to a procedure.

2. The Absoft system restricts the size of records in direct access, formatted sequential and unformatted sequential files to a maximum of 1,024 bytes. This can be a severe limitation, as many files can have considerably larger records.

3. This FORTRAN's runtime system handles differently I/O that is to be treated a block at a time, such as many data files, and character-by-character I/O, such as to the screen. It uses a set of internal buffers to manipulate the block files, while it essentially reads and writes character files one at a time. If a program terminates abnormally, the runtime system might not have flushed its block file buffers, causing data to be lost.

While these restrictions may cause problems, AC/FORTRAN, overall, offers a useful implementation of FORTRAN 77.

New Additions

Like FORTRAN 77 compilers for larger machines, AC/FORTRAN's design takes into account that the new, upcoming FORTRAN standard will eventually be accepted. Its language extensions, along with some similar to those incorporated by popular laboratory machines such as the VAX from Digital Equipment and minicomputers from Hewlett-Packard, help make this version more useful to programmers. Among the most useful of these additions are the following:

- Additional looping structures: DO WHILE, WHILE, END DO, REPEAT, CYCLE and EXIT statements.
- A statement (SELECT CASE) that gives structure to multi-decision blocks of code.
- Names up to 31 characters long.
- Recursion.
- Intrinsic Shift, Date and Time functions.
- One- and two-byte INTEGER and LOGICAL variables.
- Three functions, byte(), word() and long(), that allow the direct manipulation of specific bytes of variables.
- A function, loc(), which can get the address of any variable.

Working with the Amiga

Other extensions include a means to communicate with the Amiga's libraries. To do this, you pass the name of an Amiga support routine, followed by the arguments for that routine, to a single routine, amiga.sub, that is called. You also must include in your programs the include files for the proper Amiga library. For example, if you want to free some memory that you have previously allocated, you include in your program the file "exec.inc" and then have the following statements:

```
integer*4 size
integer*4 block
.
.
.
call amiga( FreeMem, block, size )
```

The amiga routine also can be treated as a function, for those Amiga support functions that return values.

The system does not include direct support for all of the Amiga's many operating system and ROM Kernel functions. However, it does come with the assembler source for the amiga.sub subroutine, so you can extend it yourself to work with additional routines.

In addition, the manual explains how to hook your FORTRAN programs to those written in C or assembler. The major trick here is using the compiler's option that causes it to produce assembly code and then stop. While the care needed to assure correct parameter passing will be somewhat daunting to the beginner, such connections are possible.

A Complete System

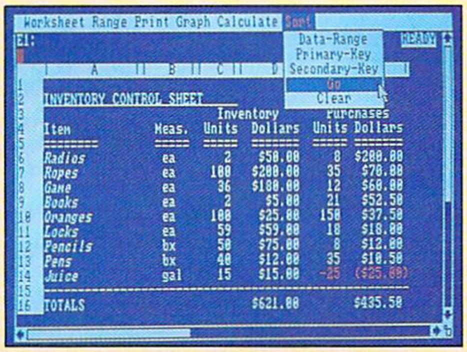
AC/FORTRAN is more than just a compiler. It comes with a linker, a librarian, a set of runtime libraries and a debugger. The linker will allow you to hook up separately compiled subroutines or access routines in libraries built by the librarian. The debugger provides source-level capabilities, including single-stepping, breakpoints and the ability to examine and change the values of variables.

The system is self-contained. The linker and compiler produce executables that are reentrant and position independent, but they are not in the standard Amiga form. Further, the linker relies heavily on dynamic linking. All undefined procedure references are treated as ►

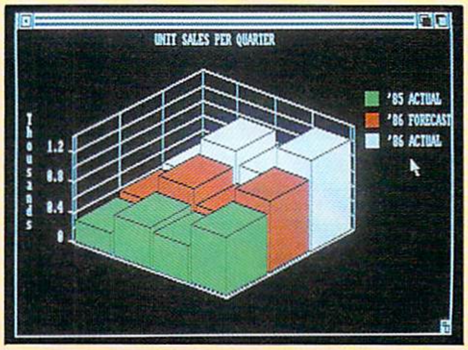
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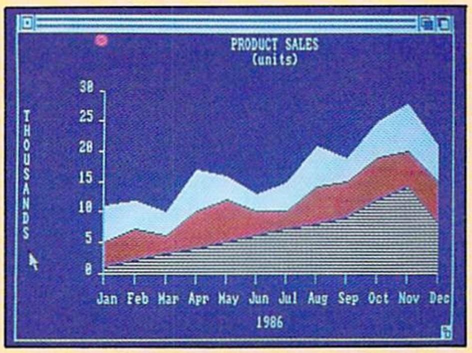
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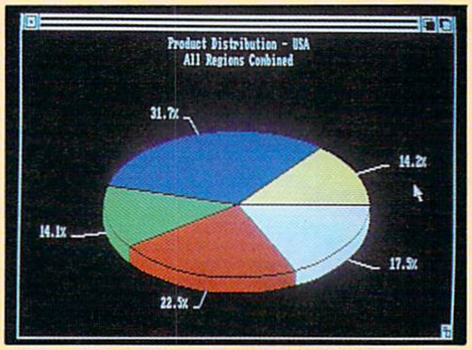
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external ones that are to be resolved at runtime. Partly because of this, the object files produced by this compiler are incredibly small. However, the runtime system must be present in order to run a program.

Except for the amiga.sub subroutine, AC/FORTRAN does not appear to be integrated with the Amiga. You can access it only from the CLI. It has pre-determined, and currently unchangeable, search rules. Amiga integration is one area in which the product definitely could use some work.

Some Bad News

AC/FORTRAN's manual is useful only to someone who already has some knowledge of FORTRAN, linkers, librarians, debuggers and the Amiga's support routines. If you are not conversant in any of these areas, this manual will do little to alleviate your confusion. Also, while there are code snippets in the manual, it contains no complete examples. The release diskette contained several example programs, but all were rather poorly documented and not for the novice. For the programmer experienced with both FORTRAN and the Amiga, however, they are useful.

The system claims to work on a 256K Amiga with a single disk drive. The release diskette is indeed only about half full, so that claim is believable. However, despite the fact that we conducted our tests on a 512K Amiga, we received an "Out of Memory" error message for each of their three sample programs that we tried to compile.

The manual warns you once to increase your stack size, but if you forget to do so (as we did), the resulting guru meditation is both frustrating and of little use. We found no problems with our test programs once we did STACK 40000 in the CLI before starting the compiler.

Another problem stopped us from ever actually testing the interface to the Amiga's support routines. We believe that it works; we ran their sample programs and they did what the code suggested they should. However, as noted above, we could not get any of the samples to compile. When we tried to write our own smaller tests, we were unable to get include files to work. Without include files, we could not access the needed Amiga support files. While it is certainly possible that we missed something, several hours of playing and two complete readings of the manual still left us unable to get the include files to work.

Benchmarks

One of AC/FORTRAN's claims was a quick compiler that produced small, fast code. Some of the small code size was due to the dynamic linking scheme it uses. Nevertheless, as Table 1 shows, the compiler is indeed very fast and does produce very small objects.

In order to make the benchmarks as meaningful as possible, we used the same tests that we ran on Lattice C (version 3.03) and Manx Aztec C68K (version 3.20a/commercial) in our comparison of these two C compilers [Nov./Dec. '86, p. 36]. For comparison purposes, we reproduced those results in the table as well. Briefly, the following are the four benchmark programs and their purposes:

fibonacci.for computes a Fibonacci series recursively. We use it to test the performance of function calls.

float.for repeatedly performs a simple, double-precision floating-point calculation. Because the Amiga handles floating-point operations in software, and because of the scientific orientation of FORTRAN, this test seems particularly important.

pointer.for was originally designed as a test for C. It cycles through an array. In the standard FORTRAN manner, it was done here with subscripts.

sieve.for is the Sieve of Eratosthenes. It computes the number of primes between 1 and 8190, and is considered by many to be a "classic" general benchmark.

We ran all of the tests on a 512K Amiga with two disk drives, using version 1.1 of the Amiga system software.

To be fair to all concerned, we must note that these comparisons simply could not be done identically. For the C systems, we used make-style command files, while the AC/FORTRAN compiler is invoked by executing a single program, which then manages all three of its own passes. Also, we could not get include files to work, so the self-timing code was directly entered into the programs, whereas the C compilers had to pay the extra cost of opening and retrieving the code. Finally, we followed the spirit of FORTRAN in some cases rather than attempting to translate exactly each C statement. This came into play primarily for loops; we used standard DO loops in almost all cases. ►

Table 1. Benchmark Results.

Program	**Execution** Time (min:sec)	**File size** (bytes)	**Compilation** Time (min:sec)
fibonacci.for	0:41	1120	0:41
Lattice	0:27	16416	4:25
Manx	0:23	6476	2:39
float.for	0:09	928	0:38
Lattice	0:29	16584	4:35
Manx	0:03	6512	2:37
pointer.for	0:53	760	0:32
Lattice	0:17	16232	4:32
Manx	0:20	6332	2:48
sieve.for	0:01	988	0:42
Lattice	0:06	24580	5:27
Manx	0:06	14684	2:53

All of these warnings aside, the benchmarks reveal some interesting facts. First, the compiler is definitely fast, several times faster than either of the C compilers. It also produces smaller objects, even taking into account its dynamic linking scheme.

The execution times are not as one-sided, although the results are understandable. Perhaps the most amazing is the sieve test, on which the FORTRAN program outperforms the C equivalents by many times. AC/FORTRAN is obviously very good at integer arithmetic. On the other hand, it falls between Manx and Lattice on the floating-point benchmark, usually a FORTRAN bastion of strength. This is probably because the Manx library works with floating-point numbers in 68000 form, while AC/FORTRAN stores and manipulates them in IEEE standard form.

AC/FORTRAN does not fare at all well on the fibonacci or pointer tests. In the case of the pointer test, this is understandable: the C programs had only to increment to go through the array, while the FORTRAN program had to increment the subscript and then compute the offset from the base. Still, this occurrence is common enough so that the AC/FORTRAN compiler probably should optimize it much better than it currently does. The poor showing on the fibonacci test reflects a higher cost of subroutine calls. This may perhaps be tied into the overhead of the dynamic linking scheme, although that is not clear. Regardless, the system clearly could use work here.

For the Professional

Although not without flaws, AC/FORTRAN is a very reasonable and nearly complete implementation of FORTRAN 77. It also offers some interesting and useful extensions. It does need improvement, particularly in order to integrate better with the Amiga's standard interface and support routines and to speed its floating-point and subroutine call performance. The documentation also needs improvement.

It is clearly oriented toward the professional FORTRAN programmer, and could well scare off the novice or those who do not know FORTRAN already. For those in its audience, and particularly for those programmers who want to connect Amigas to larger systems where FORTRAN 77 is also the dominant language, AC/FORTRAN presents new possibilities for the Amiga and its users.■

William B. Catchings is a freelance writer and software developer. Mark L. Van Name is vice president and co-founder of Foresight Computer Corp. and a freelance writer. Write to them at 10024 Sycamore Road, Durham, NC 27703.

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More That's New in 1.2

Version 1.2 offers great improvements in handling icons and gadgets, new additions to Preferences—including more printer options, and a greatly improved Notepad. And that's not all, folks.

By William B. Catchings and Mark L. Van Name

Last issue in info.phile (Jan./Feb., p. 56), we began examining the newest release of the Amiga system software, version 1.2. We reviewed changes that allow you to add more memory and new devices to your Amiga more easily than before. We also discussed some new and changed CLI commands. This time we will look at changes to some of the visible system software.

Workbench Improvements

As we noted last time, under 1.2 the Workbench has become visibly faster. A number of bugs also have been fixed and several other significant changes have been made. Some of these changes are small but improve the system's appearance. Window title bars now use two thick blue lines rather than several as in version 1.1. The CLI has a new, more descriptive icon. The Workbench disk's window is in a slightly different place on the screen and displays its contents in a cleaner arrangement.

Other improvements make working with icons simpler and more consistent. When you drag an icon, rather than seeing the drag pointer of old, you now move a copy of the icon itself. You also can drag several icons at once, using the extended-selection mechanism (by selecting multiple icons while holding down the Shift key; when you drag one, all the selected icons will move). Disk icons no longer remain on-screen when a disk is removed (unless it has open drawers). In previous releases, if you selected the icon for a disk that was not in the drive, you would often be rewarded with a system crash; this has been fixed.

String Gadget Enhancement

We have found one seemingly minor improvement to be a great boon to frequent Workbench users. In the past, when you were asked to enter a string, such as in renaming a disk or changing a directory, you had to click in the box, or *string gadget*, that contained the question before you could start typing. This seemed awkward and unnecessary. Version 1.2 offers *automatic selection* for string gadgets to address this problem. If a program uses this feature for a string gadget, you can start typing in it as soon as it appears. Nearly all Workbench and Notepad string gadgets have adopted this convention.

String gadgets have improved in other ways. When you select one, the text cursor goes to where you were pointing when you made the selection. This makes editing such strings quicker. For those used to working on other systems, Control-H is now equivalent to Backspace. Finally, you can skip the mouse in working with such gadgets by using two new keyboard shortcuts: To retry, you use Left-Amiga-B; to cancel, you use Left-Amiga-V. Little changes such as these make the Workbench a more stable, polished and productive tool.

Cleaning up Preferences

Workbench 1.2 has a new Preference utility with a number of improvements. It is now much more reliable. The Amiga developers have fixed many bugs (including one particularly annoying one that caused you to lose 16,128 bytes of main memory every time you opened Preferences). The clock within Preferences is now updated once a minute. The date is displayed in the more standard *day/month/year* format. All Preferences windows, except for Edit Pointer, have front and back gadgets as well as drag bars. (The Edit Pointer screen has a drag bar, but not front or back gadgets.)

Interlaced Mode

A new *Workbench Interlace* gadget allows you to choose from Preferences to run the Workbench in the denser 640 × 400 graphics mode. If you change this setting, you must reset the Amiga before the new setting will be used. Workbench normally operates at 640 × 200 pixels; interlacing gives you twice as many lines of resolution on your screen (400 for the typical NTSC screens, 512 if you use the European PAL standard). Interlaced mode is best if you have a high-persistence monitor, otherwise the flicker may be unbearable. And using interlacing

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does have a price: it consumes 32K of main memory for NTSC and 38K for PAL.

Serial Port Selections

In version 1.1, the only control you could exercise over the serial port was to set its baud rate. Now you have access through Preferences to an entire screen of options. Select the *Change Serial* gadget and it appears. Once in this window, you can set all of the major attributes of your serial port. The most common of these is the baud rate—the rate, in bits-per-second, at which data is transferred. Preferences' default is 9,600 baud, although for most modems you should use the 1,200-baud setting.

You can send or receive characters that are either 7- or 8-bits long. The *read bits* and *write bits* attributes let you control which size to use. You can also set the number of stop bits—bits between characters—if necessary. The parity setting allows you to specify what parity (even, odd or none) to use.

Preferences offers you two other controls over the serial port. The *buffer size* attribute determines the amount of memory that is set aside to temporarily hold the data being transferred. You sometimes can improve overall data-transfer speed by using a larger buffer size, but this does consume memory. You also can specify the type of handshaking, or simple data transfer protocol, that you want. There are currently three choices: XON/XOFF, RTS/CTS and None. If you are in doubt about any of these new settings, consult the user manual for your communications program or modem.

Printer Support Upgrade

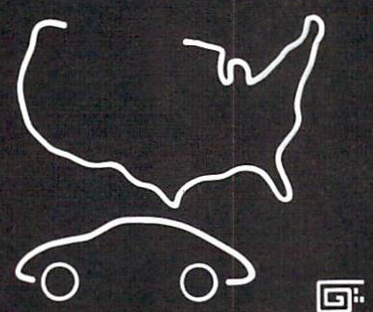
Preferences now makes it easier to use more printers with the Amiga. The list of supported printers is in the *Select Printer* window. We will review the additional ones that come with version 1.2. You can add others by putting their printer drivers in the Devs/Printers directory of your Workbench disk. The set of such drivers on the disk determines the printers shown in this window. The default printer type is now *Generic*, a simple driver that should work, though with a minimum of features, with most printers.

Preferences now supports the Apple ImageWriter II, with or without a color ribbon. It also handles three Okidata Microline printers: models 92, 192 and 292. If you plan to use either the Microline 92 or 192, be aware that they each come in two versions, one "standard" and one compatible with IBM dot-matrix printers. If you have one of the standard ones, choose it by name from the list of printers. If you have one of the IBM-compatible ones, choose CBM_MPS1000 from the list of printers. The Microline 292 can pose a similar problem, as there are two different, optional "personality cards" available for it. One makes it IBM-compatible. To use this type, again choose CBM_MPS1000 from the printer list. If you have the other card, plus a color ribbon, you can print color by choosing the Epson JX-80 setting.

Printing graphics is a different process from printing text. If you plan to print graphics on a dot-matrix printer, you must enter the Change Printer window. You then select the Custom gadget that is under the words "Paper Size." Preferences currently supports many dot-matrix printers, including the Epson FX-80, RX-80 and JX-80, the CBM MPS1000, the Apple ImageWriter II and the Okidata Okimate 20 and Microline 92, 192 and 292 models.

The Notepad Steps Forward

Preferences has always been a valuable and useful part of the Workbench. For some of ►



us, however, the Notepad occupied a different position: It seemed watered-down, a toy rather than a tool. With version 1.2, the Notepad takes a giant step toward becoming a text-entry and editing tool that many of us will use regularly. One important change is that, as we noted last time, you can run it on note files from the CLI. For users of the CLI, this means that you can edit notes created from the Workbench without having to leave your CLI session.

The Notepad looks and works better than before. There are up and down scroll gadgets that let you move your text a line at a time simply and quickly. The number of the current page appears in the previous page gadget, so you can easily see where you are in your text. These simple changes give it a more professional appearance.

Many new features have been added to the Notepad. Several of these are available by mouse selection from the new Notepad *Edit* menu. An option that is currently on appears with a check mark to the left of it in the menu. Clicking a second time on an option turns it off.

One new option is *Word Wrap*, which is now the default. If on, it causes text lines to break at word boundaries as you type your note. Other Edit menu features let you manipulate blocks of text in your note. To work on a block of text you must first mark it. One way to do this is to position the text cursor at the start of the block and then choose *Mark Place* from the Edit menu. Then move the text cursor to the end of the block and again choose Mark Place.

A quicker way to mark blocks is to double click the select button at the start and end of a block. Once you have identified a block of text, it will be highlighted. You then may do one of several things with it: You may remove it from your note and put it on the Clipboard by choosing *Cut* from the Edit menu; you can keep it in your note and put a copy of it in the Clipboard by choosing *Copy* from that menu; or you can change its style by choosing a combination of plain, italic, bold or underline from the Notepad *Style* menu. By choosing *Cancel*, the text will no longer be highlighted.

You insert text from the Clipboard into your document by moving the cursor to where you want the text to be inserted, and then selecting *Paste* from the Edit menu.

The Edit menu also lets you find and optionally replace text in a note. To do so, choose *Find*; then select the gadget *Find:* and enter the text that you wish to find. If you also want to replace that text once you find it, select the *Repl:* gadget and enter the replacement text. When you are done with these steps, press Return and then choose either the *Next* or *Last* (previous in the note) gadgets to tell the Notepad the direction of the search. Of course, you can always abort by selecting the *Cancel* gadget.

Table 1.
Version 1.2 Notepad keyboard shortcuts.

Right-Amiga Key Plus:	Calls the Notepad Function:
O	Open
S	Save
Q	Cancel
X	Cut
&	Paste
C	Copy
M	Mark place
F	Find
+	Find next
–	Find previous
R	Replace
P	Plain text
I	Italic text
B	Bold text
U	Underlined text

After you have entered the text, you can continue to search or replace more quickly. To do so, select *Find Next* or *Find Last* or *Replace*, as appropriate, from the Edit menu. All of these Edit menu options, as well as options from some other Notepad menus, have new keyboard shortcuts (see Table 1).

The Notepad also supports several other new key functions. The *Tab* key adds spaces to the left of the text cursor until the text cursor reaches the next pre-defined, eight-character-wide tab stop. You can move around quickly within a page using the Shift key and one of the four arrow keys at the same time. Shift + Up-arrow takes you to the top of the page, while Shift + Down-arrow moves you to the page's bottom. Shift + Left-arrow and Shift + Right-arrow move you to the beginning or end, respectively, of the current line.

The Notepad also has a number of new options that let you control how it uses fonts. To get at most of these, you select the Notepad icon and choose Info from the Workbench menu. Then select the *Add* gadget to the right of the words "Tool Types" and type text into the string area between these two. The text you type exercises these new options. When you are done with the text, hit Return and then select the *Save* gadget in the requester.

To start the Notepad without loading fonts from the disk, type FLAGS = NOFONTS. If you later decide you want the fonts, choose *Read Fonts* from the Notepad Project menu.

You can change the default font for an individual note or for the entire Notepad. To do so, pick the note's icon or the Notepad icon and then type text as above. This time you enter FONT = NAME.SIZE, where NAME is one of the fonts in the Notepad Font menu and SIZE is one of the sizes shown there for that font.

To change fonts while in a note, you must be sure that the *Global Font* option in the Notepad Format menu is off. If it is on, select it again to turn it off. Once it is off, you change fonts by selecting a new font and size from the Notepad Font menu. By default, the Global Font option is on. You can force it to be off or on by using the text method shown above and typing instead FLAGS = NOGLOBAL or FLAGS = GLOBAL, respectively.

When you save a note, the last font active when the Global Font option was on becomes the default font the next time you open the note. Also, if the Global Font option is on when you save a note, none of the font changes in it are saved with the note. Finally, you can remove all font or style changes from a note. To do so, choose *Remove Fonts* or *Remove Styles*, respectively, from the Notepad Format menu.

And Still More . . .

Even though we have devoted two columns to version 1.2, we have only touched the surface. New features to support Amiga software developers have been added (such as a circle-graphics primitive), as well as still more new Notepad options, bug fixes that help all of us, and new information that will allow hardware developers to make Amiga add-ons more easily than before. Included on the Workbench disk are a screen dump utility and a text to speech utility. And we haven't even touched on the new EXTRAS disk! We think you'll agree that version 1.2 of the Amiga system software is an important step forward for the Amiga.■

Bill Catchings is a freelance writer and a software developer. Mark Van Name is vice president and co-founder of Foresight Computer Corp. and a freelance writer. Write to them at 10024 Sycamore Road, Durham, NC 27703.

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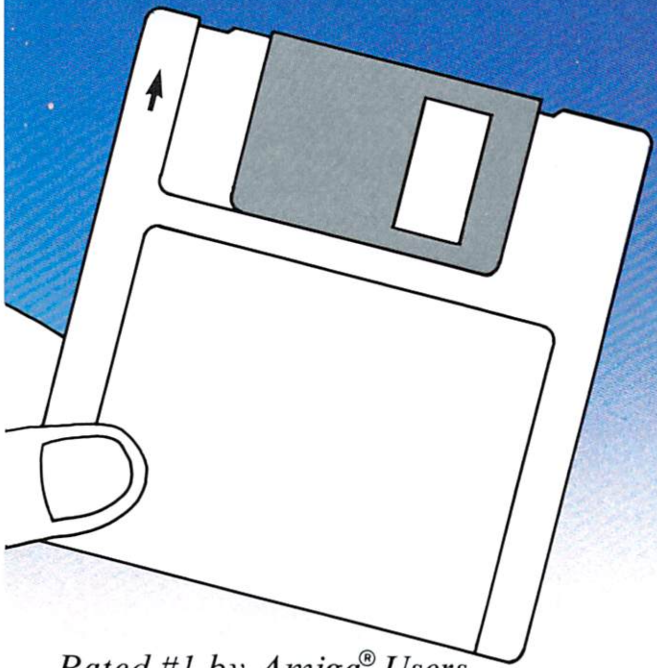
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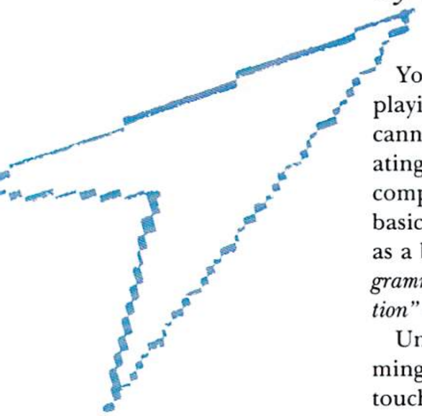
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Playing with Intuition

The final installment of our four-part tutorial on programming in C. With the basics behind us, we have come to the payoff.

By William B. Catchings and Mark L. Van Name



You have now learned enough C to have some fun playing with your Amiga's capabilities. Obviously, we cannot cover all of the functions of the Intuition operating system in one article. However, without being complete or even totally methodical, we will give you a basic understanding of how it works. This should serve as a basis for further exploration. [*For a close look at programming Intuition menus, see "Creating Menus with Intuition" in our Jan./Feb. '87 issue, p. 48. —Editors*]

Unfortunately, most of the existing Amiga programming books focus on either C or Intuition, and merely touch on the other. If you want to write programs that use Intuition, there is one book that you must own: the *Amiga Intuition Manual*. It does not give many examples, but it describes most of the functions you will need. What you learn from that manual, coupled with this tutorial, should be enough to get you started on Intuition programming.

Playing with Our Sample

Our sample program is a simple one called *play.c*. It is a toy and nothing more, a somewhat mild-mannered shoot-'em-up game that might give you a few minutes of simple entertainment. More to the point, it is short, and yet it uses quite a few different Intuition functions. *play.c* displays a window on your screen. The window contains two boxes. The smaller box is your target. The larger box contains cross hairs; this is your viewfinder. Your goal is to move the viewfinder on top of the target and click the left mouse button. The faster you do so, the more points you score. Your score is actually three numbers: the total score, the score of your last hit and the total number of hits. When you are finished playing, exit the program by clicking on the window's close gadget.

We wrote and tested *play.c* on a standard, single-drive, 512K Amiga system. Due to space limitations, we did not worry about handling all possible errors. While we cannot guarantee that it will work on your system, we believe that it will.

You may want to save some of the routines from *play.c* to start an Amiga C library of your own. One common goal with C programming is to build up such a library so that each successive program you write requires less new code.

Intuition Overview

The Amiga's system software is composed of several different parts. The lowest-level part, or *kernel*, is actually several system modules. Some of these are stored in the protected *kickstart* memory, while others are loaded as needed from your system disk.

Built on this part is another major one, the Intuition system. It is used by Workbench and many of the utilities. It is composed of functions. These functions were designed to be accessed by C programs (even though much of the initial operating system was written in the language BCPL).

We will discuss several functions in each of a few important areas. We use *play.c* as an example throughout.

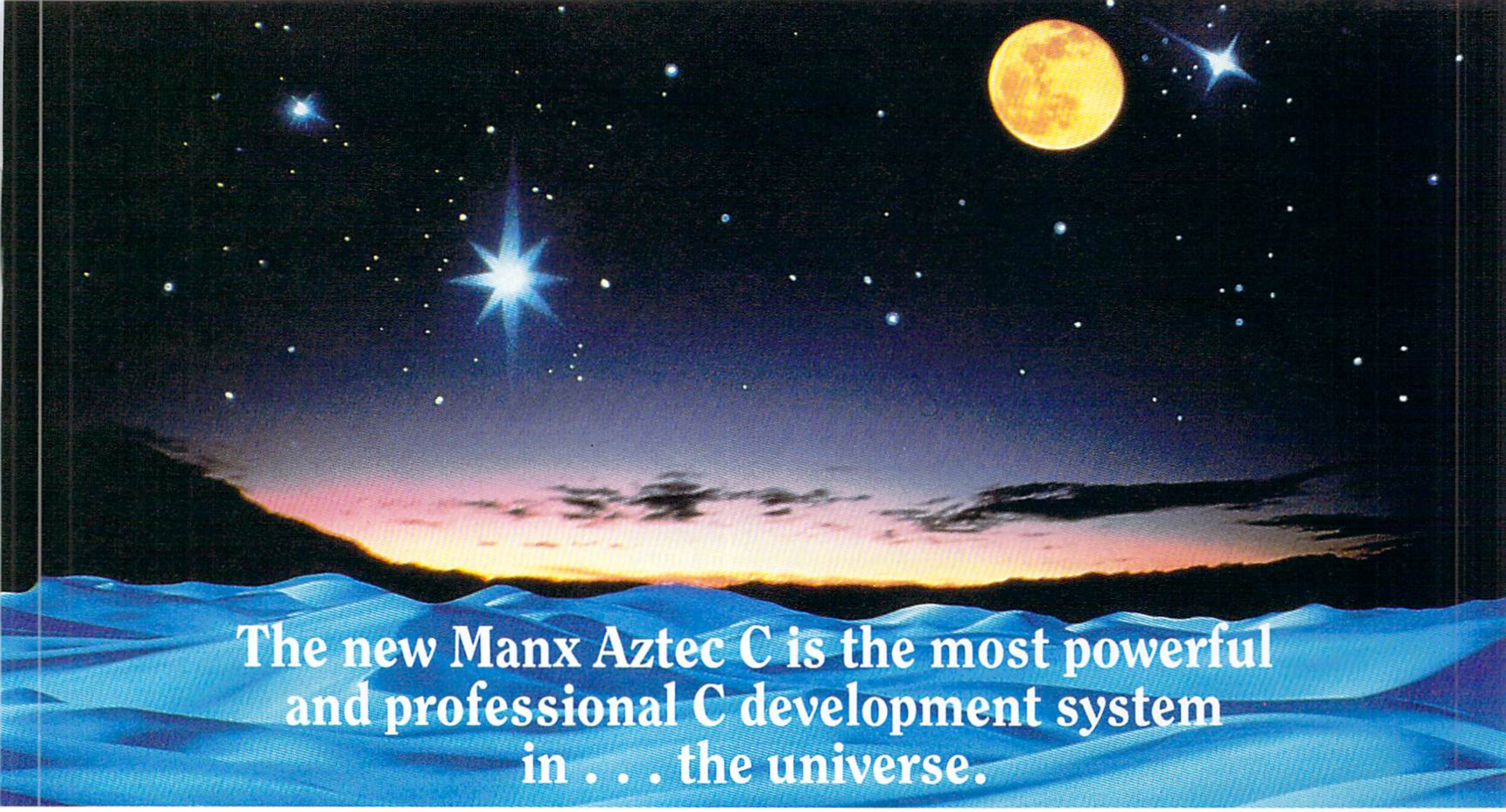
Libraries

Intuition's functions are stored in libraries on your system disk. These libraries are only loaded into memory when an executing program asks for them.

You load a library when you need it by using the *OpenLibrary()* Intuition function call. The function requires two arguments: an ASCII string that is the name of the library and the version number of the library. In *play.c* we open the Intuition and the graphics libraries. By convention, the name of the library is followed by ".library" as in *intuition.library*. The version number indicates what version of that library you require. If the available library is greater than or equal to that number, then it is at least upwardly compatible with the one you want, and so the call succeeds. If you specify zero for the version number, this check is ignored. We used the constant LIBRARYVERSION to specify the current library at compile time.

OpenLibrary() returns a pointer to the base address at which the library is loaded. If this pointer is null, then either the library was not found or there was not enough memory free to load it.

When you are done with a library, you should close it so that you do not waste main memory. You close it by ►



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Byte November, 1986

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Amiga World November, 1986

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passing this pointer to the *CloseLibrary()* function.

Windows

Once we have opened the required libraries, we are ready to display something on the monitor. You can use Intuition to display data within two primary vehicles: *screens* and *windows*.

You use screens when your program must have complete control of the display and you do not care about working with other programs. Most systems do not offer multitasking capabilities. On such systems, this is typically the way you would manipulate the display. Also, working with the screen in this fashion is often the fastest possible way. This is how most of the current Amiga games have been written.

However, the Amiga can allow more than one program to run simultaneously. All such programs that use the display then must share it. You share the display by using windows. For example, when you have two different versions of the CLI running at once, each is in its own window.

Since *play.c* is only a simple game, we decided to make it display through a window. You will often want to set up and open windows in Amiga C programs. With this in mind, we put the window initialization and opening code in an independent routine that you may want to save for other programs as part of your growing C function library.

To build a window you must fill in the *Window* data structure. To do so you must initialize many fields. Most of these are either self-explanatory or used only in complicated programs. A few deserve special explanation. You set the two edge fields to determine the starting upper-left coordinates of your window. You use the width and height fields to specify the starting window size and, if the user is allowed to resize the window, the maximum and minimum sizes for it.

The *Flags* field can be more confusing. You use it to tell what gadgets you want for your window, how your window's updating should be handled, and to specify other parameters. In our window-initialization code, we turn on all the window gadgets, including dragging, resizing, depth arranging and closing. The ACTIVATE flag indicates that our new window should become the active window when it is opened. We require that the window image be updated any time it is first covered, by another window or requestor, and then uncovered. Because we do not want to worry about updating the window in *play.c,* we used the option SMARTREFRESH to let the system do it for us.

IDCMP

The field *IDCMPFlags* of the *NewWindow* structure leads us to our next topic: Intuition's Direct Communications Message Port (IDCMP).

IDCMP allows your program to communicate with Intuition. Whenever some form of outside input is given to the Amiga, usually from the mouse or keyboard, an *InputEvent* is built. It describes what happened. Intuition also uses events to indicate disk ►

Setting Up Your Program Development Disks

In the first installment of this series (July/August '86), we gave instructions on how to set up two disks for program development, C-CLI and C-DEVEL. We assumed that you owned Lattice (or Amiga) C, and we referred to Appendix D of its revised 1.1 manual. Many readers have written to us with the news that there is no such appendix. But we do have one. As it turns out, the appendix came with our development system from Commodore.

It is not something that Lattice distributes. So, to clear up any confusion, here is a summary of the relevant portions of that appendix.

Create the C-CLI disk as follows. Diskcopy your original Workbench disk and name the copy C-CLI. Then reboot with C-CLI and change it in the following ways. Use Preferences to activate the CLI and go to 80-column mode. Make any other changes your system may require while you are here, and then save your changes.

Start up the CLI and close all other active windows. Then insert into DF1: the disk (from Lattice) named C-DEVEL. In the CLI window, type:

```
EXECUTE DF1:s/make_c_cli.
```

You will get a number of messages that tell you about the excess files that are being cleared from various directories. When you get the message "Done," this disk is ready.

To make your C-DEVEL disk, first make a diskcopy of the C-DEVEL disk from Lattice. Name it C-DEVEL. Reboot with the C-CLI disk you just made. You will be left in the CLI. Put the new C-DEVEL copy in DF1:. Copy the commands from the C-DEVEL disk to the C-CLI disk by typing:

```
COPY DF1:c c:
```

Then remove them from the C-DEVEL disk by entering:

```
DELETE DF1:c/#?
```

Your two disks are ready to go. We suggest that you

```
COPY DF1:examples/make#? DF0:s
```

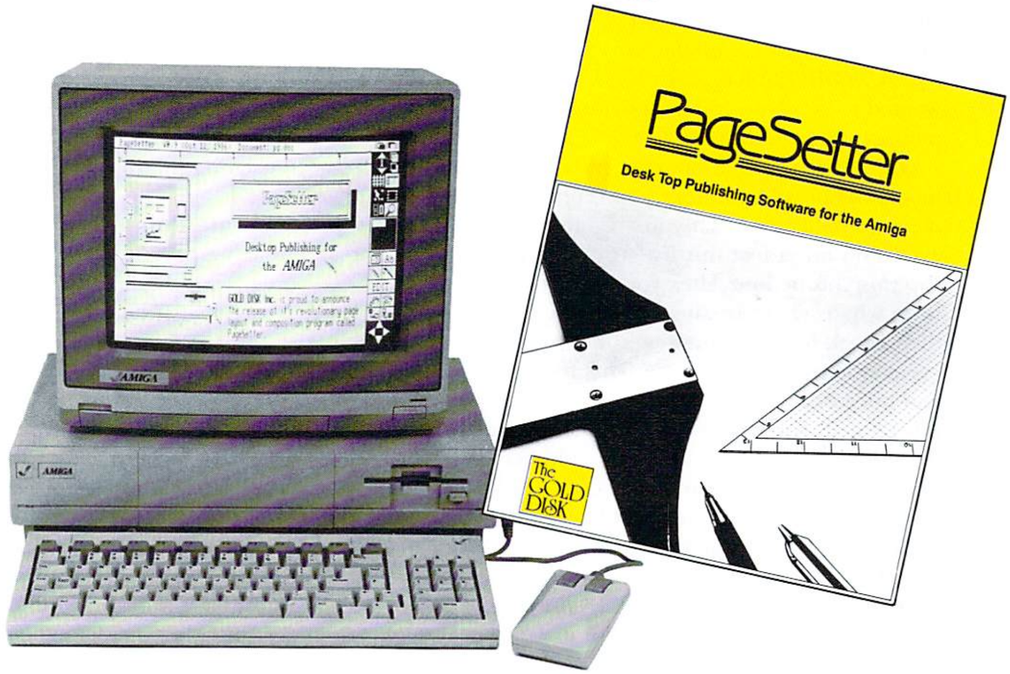
so that the *makesimple* command is available to you at all times. Also, we suggest you make one or more directories for your programs on the C-DEVEL disk.

We apologize for any difficulties or confusion that our earlier error might have caused.□

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insertion or removal, the passage of time, and the fact that new preferences have been chosen. Each new event is placed at the back of a queue of other such events.

You receive events in your program via messages. The function *GetMsg()* returns a pointer to the first message in the queue, or NULL if there are none. You must specify a *UserPort* through which to receive your messages. When you open a window, Intuition supplies you with a *UserPort*. You use the *IDCMPFlags* field of the *NewWindow* structure to state which of the possible IDCMP message classes you want to be placed in your event queue. In this way, you can limit the number of messages your program must handle. In our window opening routine, to be fairly general, we asked to be given only WINDOWCLOSE messages.

You are not stuck forever with this set of message classes. You can modify the set while your program is running; your window's *UserPort* will receive all messages of the new set of classes. You do this with the *ModifyIDCMP()* function. In *play.c*, we indicated that we wanted to receive window-resizing, window-closing and mouse-button event messages.

Once you receive a message, you should reply to it as quickly as possible. Before you reply, you must save the message fields in which you are interested, so that later events do not affect this list. You then reply with the *ReplyMsg()* function. After you have replied, you perform whatever processing the messages require and then check for more messages in your queue. Each event is marked with a time. This time is the seconds and microseconds that have elapsed since the Amiga was booted. For our game, we want to translate this into an approximate number of milliseconds. To do so, we divide the microseconds by 1,024 (right-shift 10 bits), multiply the seconds by 1,024 (left-shift 10), and then add the two numbers together.

The simplest thing to do would be to loop back and try to get another message with *GetMsg()*. However, there may be other processes running on the Amiga that could use the CPU cycles that such a busy loop would waste. Therefore, when there are no more messages in our queue, we *Wait()* until another event message arrives at our *UserPort*. To wait in this fashion, you must use the following rather obscure notation:

```
Wait (1 << my_window -> UserPort -> mp_
   SigBit);
```

This statement simply left-shifts the signal bit number to the position assigned at run time to your *UserPort*. *Wait()* returns when there is an event message.

When we receive a CLOSEWINDOW message, we clean up any mess the program has left and then *exit()*.

We also must deal with the problem that resizing the window could obscure the target. Because of this, when we receive a NEWSIZE message, we give the player a new target.

Most of the actual code in *play.c* is executed when a MOUSEBUTTON event occurs. Because we did not specify otherwise, we only receive a mouse-button event when the selection (left) button is pressed or released. If the event is a SELECTDOWN code, we ignore it. We only want to act when the "click" is completed by releasing the button, which we receive as a SELECTUP code.

When a SELECTUP occurs, we first check the mouse's position. We retrieved this position from the event message before we replied. We must decide whether the mouse was "close" to the box. We decide in the hit routine by checking if the difference in the two sets of coordinates is less than the accuracy delta defined by ACCURACY. We give the player only three seconds to hit each target. Therefore, if the mouse was close enough, we subtract from 3,000 the number of elapsed milliseconds between when the box was drawn and when the mouse button was released. This gives us the score.

We get the SELECTUP's time from the *IntuiMessage* structure.

Once we have the score (total, for this hit and number of hits), we must display it. We pass the score to the routine *writescore*() for display. Then we draw a new box with our function *putbox()*. *putbox()* also gets the time after it has drawn the box by calling *CurrentTime()* and translating the result into milliseconds as before.

Alternate Pointer

So far we have not discussed how to move the viewfinder with the mouse. Yet, if you run the program you will see that it does indeed move with the mouse. We could have moved it by creating a sprite, asking for MOUSEMOVE events and then moving the sprite appropriately. But we didn't. We cheated.

We took advantage of the fact that the mouse pointer is actually sprite zero of the eight sprites available on the Amiga. We used the *SetPointer()* function to change the shape of the mouse pointer from its normal arrow form to our viewfinder. *SetPointer()* causes this change to occur only when the specified window is active. If you activate another window, the pointer will return to its familiar arrow shape.

Sprites are low-resolution graphics objects that are maintained on the screen separately from the rest of the display by the Amiga's hardware. Since they are handled separately by the hardware, you do not need to erase them when you move them. They can be up to sixteen dots wide and any height. They exist in two bit planes, which gives you four colors with which to work. One of these colors, color zero, is special. It is "see-through." This lets you build "holes" and non-rectangular sprites.

You give a sprite its shape with an array of word pairs. The sixteen bits in each word correspond to the width of the sprite. The bits of each word in the pair specify whether that bit's color should be 0, 1, 2 or 3. A pair of zero words start and begin the array. Our sprite data array, *ptr_data*, defines a square with cross hairs. Getting exactly the image you want from such an array can require some time. The best way is to start with a sprite that is close to what you want and then change it as needed.

The *SetPointer()* function requires several arguments: the window in which you will use the alternate pointer, the sprite data array, the height, the width and the x- ▶

and y-center offset. These last two values define the place on the pointer that actually determines its location, or its *activation point*. The standard arrow pointer has an x and y offset of 0, 0. This means that its activation point is in the upper-left corner, the point of the arrow. We are trying to build a pointer that looks like a viewfinder. Therefore, we want the activation point to be at the meeting of the cross hairs. We specified an x and y offset of −8, −6. This tells Intuition to shift the pointer position −8 dots horizontally (minus indicates left) and −6 dots vertically (minus indicates up). When we get the coordinates of the mouse pointer in a SELECTUP event, it will be the coordinates of the center of our pointer.

It is important to note that any graphics object that is manipulated by the Amiga's display hardware, such as a sprite, must be in *chip memory* (the first 512K). If you only have 512K of memory or less, then this is not a problem. If you have additional memory, you should use the ATOM tool on the executable file that contains the sprite's definition array. The loader then will automatically force that part of your program to be in chip memory. You can find more information about the ATOM tool and the loader in the *AmigaDOS User's Manual.*

Simple Graphics

We do only a little bit of Amiga graphics in *play.c*. However, it serves as a good introductory example. In order to draw a graphics item, such as a line or some shape, you use a *rastport*. A rastport handles such tasks as keeping your graphics objects within your window, keeping track of your drawing pens and other miscellaneous functions that you probably do not want to do yourself.

When you open a window, Intuition provides you with a default rastport (*RPort*). We use this for all of our drawing. When drawing, you use one or more pens. A pen has associated with it a color register. To draw lines and simple graphics, you need just one pen—the foreground pen. You set this pen to one of the Amiga's 32 available pens with the *SetAPen()* function. There is also another pen that is used in some drawings—the background pen. You can set it with the function *SetBPen()*. By default, the background pen is pen zero.

We draw the target box by using the *PolyDraw()* function. This function works by drawing successive lines from the current position to the first position in the coordinates structure and from the first coordinate to the second, for as many points as you specify. The array *corners* contains the four points of a square. We first call *Move()* to position the pen and then call *PolyDraw()* to draw lines that connect the four points of the square.

In our example, we use the *SetAPen()* function to set the foreground pen alternately to pen 0 and then to pen 1. We use pen 0 to draw in the background's color. This erases the previous box. The previous box's coordinates are still in the *corners* array because it is a *static* array.

We then *SetAPen()* back to pen 1 to draw the next box.

The target is supposed to be drawn in random positions. We use the Lattice C library random-number functions *rand()* and *srand()* to generate the box's coordinates each time we must move it. We give *srand()* an initial seed value based on the time. This helps to avoid having the same box positions every time you run the program. *rand()* returns a number between 0 and the largest integer. We scale that value by ANDing it down to 1,024 for the x location and 512 for the y. If the scaled-down number is larger than our window, we try again until it is correct. We then use this x and y to ►

Continued on p. 102.

Improving the Sample Program

The programs that we have provided as samples are by no means perfect. However, they can serve as starting places for other, more useful ones.

In order to get either the *wordcount* program or the *text analysis* program to process an input file, you have to redirect the standard input. Both would be more useful if they instead took an input file name as a command line argument. You could even make them able to process all of the files that matched an AmigaDOS-style wildcard.

There is one program that you can change from wrong to right! On page 60 of the September/October '86 issue, in our sample function *cpystr*, there is an error. The *if* statement shown there should break out of the *for* loop when **dest* = = '\0', not when **dest* != '\0'. Our thanks to Henry L. Warner of Lynn Haven, FL, for catching this error.

You could do many different things to spruce up *play.c*, our sample program this time. One easy improvement would be to utilize better the Amiga's colors. In the sample, we never try to specify the colors directly. Instead, we use whatever colors are already present in the color registers. You could use the *SetRGB4()* function to set the color of the pens you used.

Our viewfinder is a simple, boring box. You could change its shape, perhaps into something a bit more like a gunsight. Add some motion. Try moving the target box a few pixels in a random direction every couple of INTUITICKS events (about ten occur every second).

You also could change the program so that it handles ACTIVEWINDOW and INACTIVEWINDOW events. The player should be able to have a new target if he goes to another window and then returns.

One caution: save a recent, working copy! When you program relatively close to the machine, as in this program, you can easily ruin your source file, or even your disk.□

Magazine

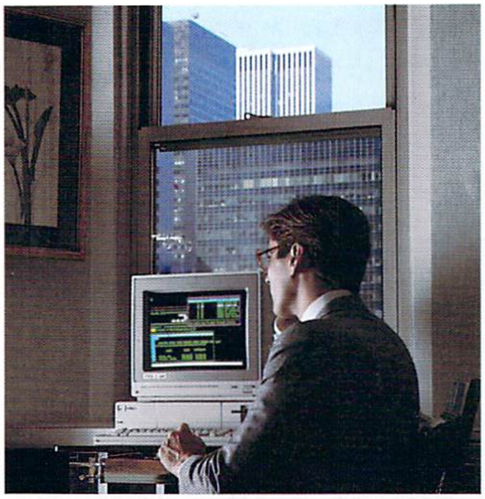
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This month's exhibit features the work of Armond Deveno, a "mostly self-taught" artist who lives and works on his Amiga in Springfield, Massachusetts.



Though he has had some graphic arts training, Armond Deveno is primarily interested in painting. Armond's interest in and enthusiasm for computer art are evident in his work; sometimes, he says, the newness of this artform makes him feel ". . . like a medieval monk must have felt in front of an illuminated manuscript."

Armond was introduced to computer art while looking for a good game computer; he was first captivated by MicroIllustrator on an Apple II. As he related to *AmigaWorld*, his first exposure with computer art reminded him of his childhood experiences with *The Winki Dee Show*, a kids' show that had a segment when you could attach a special drawing board to the TV screen and trace drawings. Armond maintained a fascination with the idea of artistic interaction with the cathode ray tube.

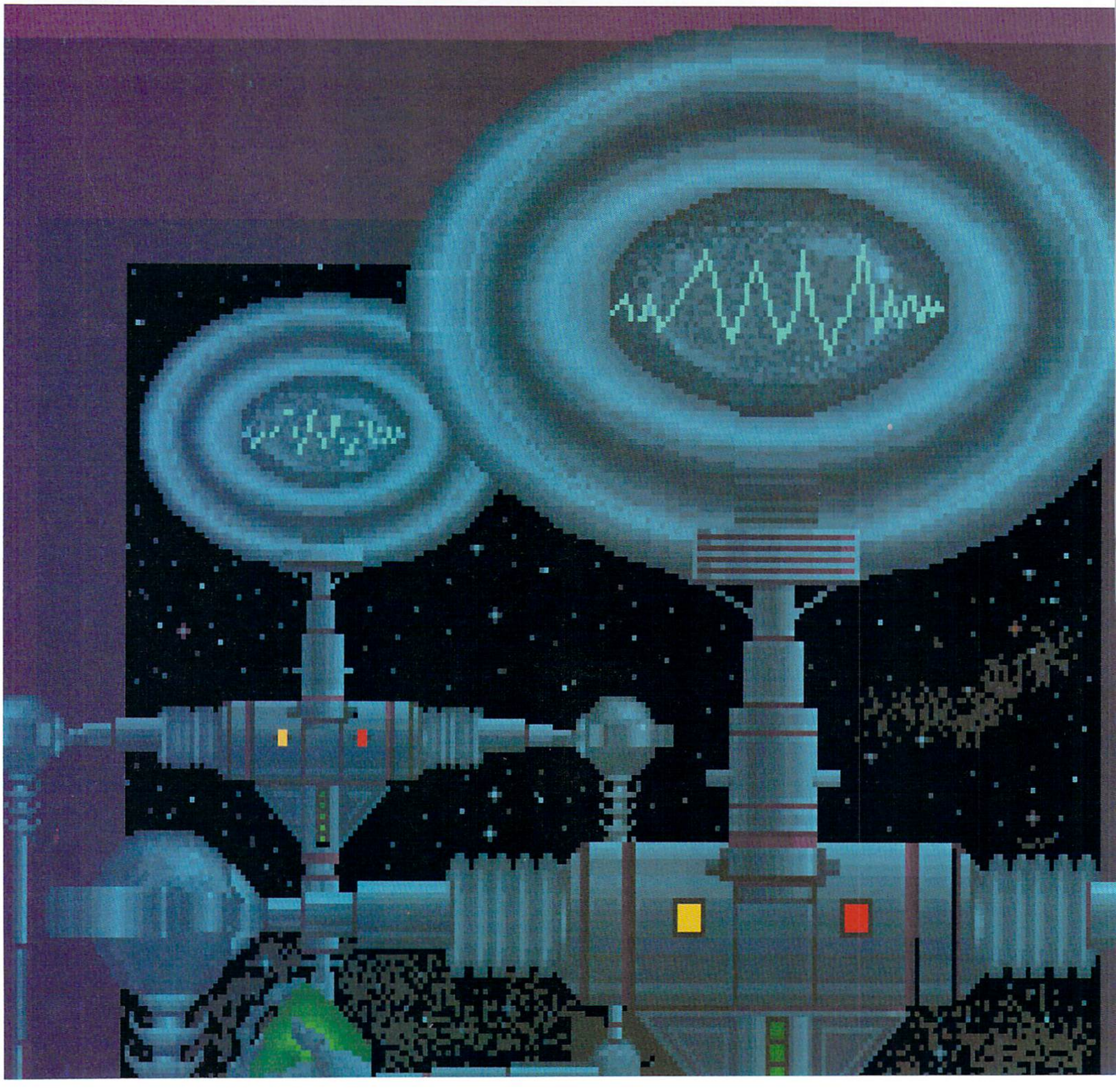
Armond waited for "minicomputer technology to come down to micros." He bought a Mindset computer, and then, after reading about the chips Jay Miner was working on, became convinced he had to have an Amiga. He likes the ability to rapidly change colors, the instant feedback and the ability to combine and manipulate digitized art with computer paintings. He also enjoys not having to clean up. ■

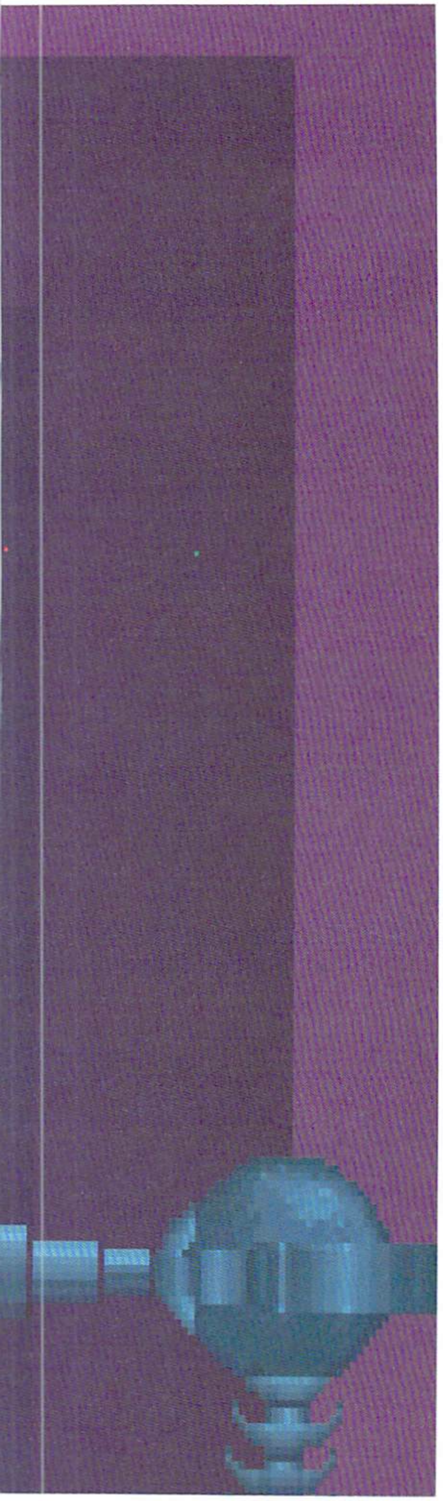
Anyone submitting artwork to be considered for exhibit in Digital Canvas should send the artwork on a disk and properly packaged to:

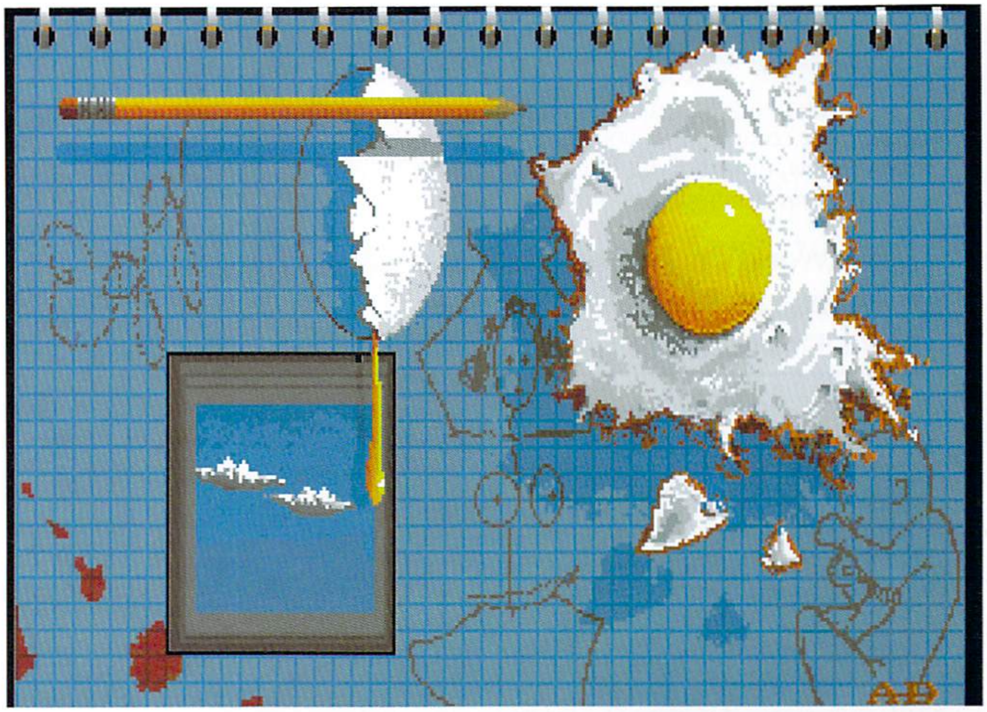
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Peterborough, NH 03458
Attn: Art Director

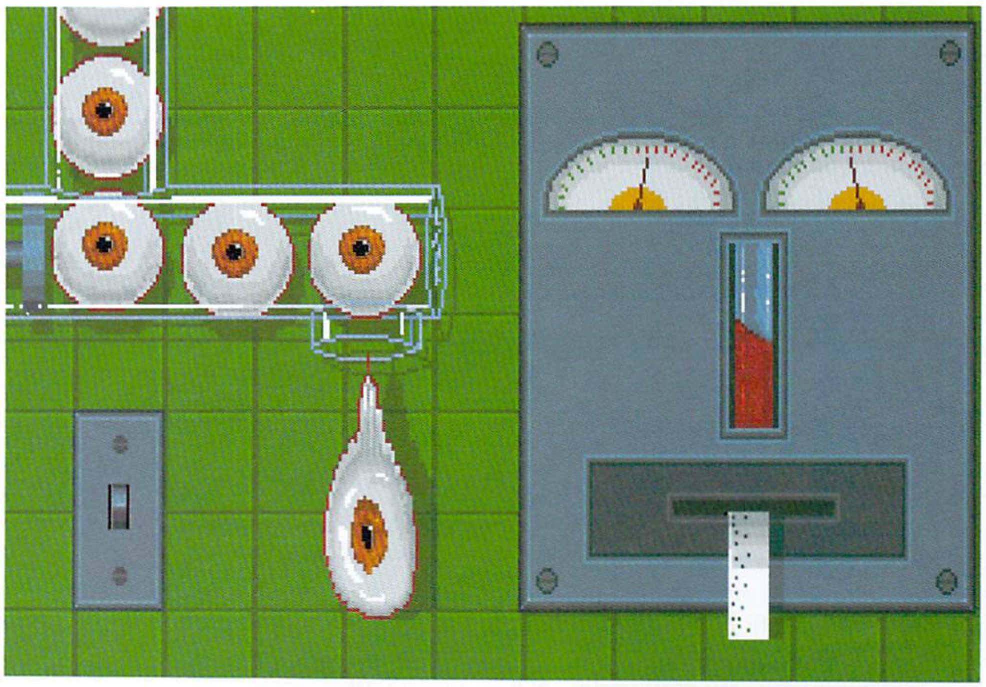
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Easy Palettes

An Amiga Basic program

that allows you

to create custom color palettes.

By Christoph C. Borel-Donohue

Here's an interactive way to create your own palette of colors for your Amiga Basic programs. Along the way, you will learn how to use some of the advanced features of Amiga Basic, such as opening windows, asking the mouse's position, and using pull-down menus.

The Easy Palette program lets you create, modify and store Amiga Basic palettes. Here's how it works.

First, the program defines a screen (in this example, a low-resolution screen with 320 × 200 pixels) using the Screen command. Then a window is defined that is just large enough to hold the palette, three mixing bars and a big area that shows the currently selected color. A subroutine called INITPALETTE then assigns the gray tones to the different colors and calls the subroutine named ALLCOLOR, which draws the mixing bars. The pull-down menu is initialized by INITMENU.

Main Loop

The main program loop consists of three lines. In the first statement, the program checks to see if the pull-down menu has been activated by the right-mouse button. If that has happened, the program jumps to the CHECKMENU routine to determine which menu item (Store, Specials or Actions) has been selected.

The second line of the main loop tests whether the left-mouse button is activated. If so, the subroutine CHECKMOUSE is entered. The vertical position of the mouse determines whether a new color on the palette is selected or if one of the color sliders has to be moved. The horizontal position determines which color is being edited. This, the current color, also appears in a big rectangle on the left of the screen. By adjusting the color sliders, any of the Amiga's 4,096 colors can be produced. As mentioned earlier, only 16 colors are available at one time for the mixing process, but if you select the menu item Upper/Lower Palette, you can toggle between the values of the upper or lower palette. This keeps the display from changing colors as it would if all 32 colors were on-screen together.

To make the color-mixing process more user friendly, a number of extra features have been added. It is possible to swap two colors, to copy a color to another color and to mix two colors together. You might want to generate a range of colors (e.g., from dark blue to light green). By selecting Spread Color, the RGB (red, green, blue) values are linearily interpolated. Finally, it is possible to change the brightness of the selected color by pressing two different keys to lighten or darken it.

Storing the Palette

Storing the palette as a data file can be done with the Store menu by selecting Save Color Table. The RGB values of each color are written on a data file and can be used in any program you design.

It is possible to load any color palette data file for modifications. The Easy Palettes program listing shows you how to convert the RGB values back into colors (subroutine LOADCOLOR).

If a color palette is never changed in an application program, Save Subroutine should be selected from the menu. The program then writes a subroutine (LOADCOLOR2) on a user-selectable data file that can be merged to your own programs.

Finally, to get out of the main program loop, select Exit Program. ■

Address all author correspondence to Christoph C. Borel-Donohue, 34 Dickinson St., Amherst, MA 01002.

***Listing 1.** Easy Palettes*

```
     'EASY PALETTES   : A interactive color mixing program
     '-----------------------------------------
     'COPYRIGHT BY CHRISTOPH C.BOREL-DONOHUE
     'WRITTEN IN AMIGA-BASIC MAY.1986
     '
     DEFINT A-Z
     DIM P(3,31),RGBS!(3),RGB(3),RGBN(3)
     SCREEN 2,320,200,5,1
     WINDOW 2,"PALETTE",(10,10)-(300,100),2,2
     WINDOW OUTPUT (2)
     GOSUB INITPALETTE
     GOSUB INITMENU

LOOP: 'check if mouse has been activated
     ON MENU GOSUB CHECKMENU : MENU ON
     IF MOUSE(0)<>0 THEN GOSUB CHECKMOUSE : MOUSE ON
     GOTO LOOP

CHECKMOUSE: 'get mouse position and adjust gauges
     X=MOUSE(1)
     Y=MOUSE(2)
     IF X>165 THEN X=165
     IF X<10 THEN X=10
```

Listing continued on p. 74.

```
    XM=(X-15)/10
    IF Y<20 THEN
      COL=XM+16
      IF COL<>COLOLD THEN GOSUB ALLCOLOR
      COLOLD=COL
    ELSE
      C=(Y-25)/10
      IF C MOD 2=0 THEN RETURN
      C=(C+1)/2
      IF (C<1) OR (C>3) THEN RETURN
      ON C GOSUB RED,GREEN,BLUE
      P(C,COL)=XM
      GOSUB MIX
    END IF
    RETURN

CHECKMENU: 'branch to subroutines
    MENUID=MENU(0)
    MENUITEM=MENU(1)
    ON MENUID GOSUB DATAFILE,SPECIAL,EXITPALETTE
    RETURN

DATAFILE: 'save/load color tables
    LOCATE 3,2 : INPUT "FILENAME";FILE$
    ON MENUITEM GOSUB SAVECOLOR,LOADCOLOR,SAVESUB
    GOSUB ALLCOLOR
    LOCATE 3,2 : PRINT STRING$(26," ");
    RETURN

SAVECOLOR: 'save color table
    OPEN "O",#1,FILE$
    IF SWITCH=1 THEN GOSUB SWITCH
    FOR I=0 TO 31
       WRITE#1,P(1,I),P(2,I),P(3,I)
    NEXT I
    CLOSE #1
    RETURN

LOADCOLOR: 'load color table
    OPEN "I",#1,FILE$
    FOR I=0 TO 31
       INPUT#1,P(1,I),P(2,I),P(3,I)
       IF I>15 THEN PALETTE I,P(1,I)/15!,P(2,I)/15!,P(3,I)/15!
    NEXT I
    CLOSE #1
    CLS
    RETURN

SAVESUB: 'save color subroutine
    RED$="" : GREEN$="" : BLUE$="" : H$=CHR$(34)
    FOR I=0 TO 31
      RED$=RED$+CHR$(65+P(1,I))
      GREEN$=GREEN$+CHR$(65+P(2,I))
      BLUE$=BLUE$+CHR$(65+P(3,I))
    NEXT I
    OPEN "O",#1,FILE$
    PRINT#1,"LOADCOLOR2:"
    PRINT#1,"  RED$=";H$;RED$;H$
    PRINT#1,"  GREEN$=";H$;GREEN$;H$
    PRINT#1,"  BLUE$=";H$;BLUE$;H$
    PRINT#1,"  FOR I=1 TO 32"
    PRINT#1,"     R=ASC(MID$(RED$,I,1))-65"
    PRINT#1,"     G=ASC(MID$(GREEN$,I,1))-65"
    PRINT#1,"     B=ASC(MID$(BLUE$,I,1))-65"
    PRINT#1,"     PALETTE I-1,R/15.!,G/15.!,B/15.!"
    PRINT#1,"  NEXT I"
    PRINT#1,"  RETURN"
    CLOSE#1
    RETURN

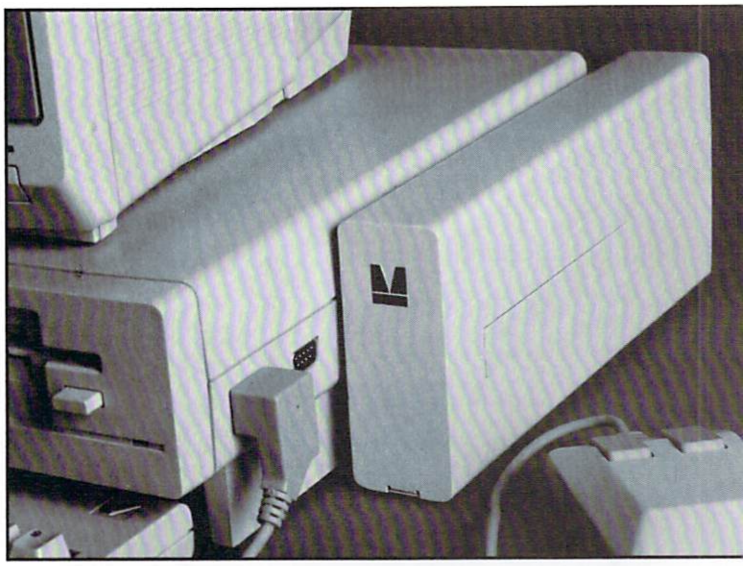
SPECIAL: 'special color feature
  ON MENUITEM GOSUB SWITCH,SWAPCOL,SPREAD,COPYCOL,MIXCOL,CHBRIGHT
  GOSUB ALLCOLOR
  RETURN

SWITCH: 'switch between upper/lower palettes
```

Listing continued on p. 76.

AVAILABLE NOW!

StarBoard2



Auto-Configuring Fast RAM
Zero Wait States
User Expandable from 512k to 2 Megabytes
Bus Pass-Through
MultiFunction Option: battery/ clock, FPU, parity, Sticky-Disk

If you've owned your Amiga® for a while now, you *know* you definitely need more than 512k of memory. You probably need *at least* double that amount...but you might need as much as an additional two megabytes. We want to urge you to use **StarBoard2** as the solution to your memory expansion problem –and to some of your other Amiga-expansion needs as well!

It's small, but it's BIG–

Since most of you want to expand your Amiga's memory without having to also expand your computer table, we designed **StarBoard2** and its two optional "daughterboards" to fit into a sleek, unobtrusive Amiga-styled case that snugly fastens to your computer with two precision-machined jackscrews.

The sculpted steel case of **StarBoard2** measures only 1.6" wide by 4.3" high by 10.2" long. You can access the inside of the case by removing just two small screws on the bottom and pulling it apart. We make **StarBoard2** easy to get into so that you or your dealer can expand it by installing up to one megabyte of RAM on the standard **StarBoard2** or up to two megabytes by adding in an Upper Deck.

This card has decks!

The basic **StarBoard2** starts out as a one megabyte memory space with 0k, 512k, or one megabyte installed. If you add in an optional **Upper Deck** (which plugs onto the Main Board inside the case) you bring **StarBoard2** up to its full two megabyte potential. You can buy your **StarBoard2** with the Upper Deck (populated or unpopulated) or buy the Upper Deck later as your need for memory grows.

And you can add other functions to **StarBoard2** by plugging in its second optional deck –the Multifunction Module!

StarBoard2: functions five!

If we count Fast Memory as one function, the addition of the **MultiFunction Module** brings the total up to five!

THE CLOCK FUNCTION:

Whenever you boot your Amiga you have to tell it what time it is! Add a MultiFunction Module to your **StarBoard2** and you can hand that tedious task to the battery-backed, real-time clock/calendar. A small piece of MicroBotics software in your WorkBench Startup-Sequence reads the clock and automatically sets the time and date in your Amiga. And the battery *is* included (we designed it to use an inexpensive, standard AAA battery which will last at least two years before needing replacement).

THE FLOATING POINT FUNCTION:

If any one aspect most characterizes the Amiga it's *fast* graphics! Most graphic routines make heavy use of the Amiga Floating Point Library. Replacing this library with the one we give you with your MultiFunction Module and installing a separately purchased Motorola 68881 FPU chip in the socket provided by the Module will speed up these math operations from 5 to 40 times! And if you write your own software, you can directly address this chip for increased speed in integer arithmetic operations in addition to floating point math.

THE PARITY CHECKING FUNCTION:

If you install an additional ninth RAM chip for every eight in your **StarBoard2**, then you can enable *parity checking*. Parity checking will alert you (with a bus-error message) in the event of any data corruption in **StarBoard2**'s memory space. So what good is it to know that your data's messed up if the hardware can't fix it for you? It will warn you against saving that data to disk and possibly destroying your database or your massive spreadsheet. The more memory you have in your system the more likely it is, statistically, that random errors will occur. Parity checking gives you some protection from this threat to your data residing in Fast RAM. Note that the Amiga's "chip" RAM cannot be parity checked.

THE IMMORTAL MEMORY DISK FUNCTION (STICKY-DISK):

When you've got a lot of RAM, you can make nice big RAM-Disks and speed up your Amiga's operations a lot! But there's one bad thing about RAM-Disks: they go away when you re-boot your machine. Sticky-Disk solves that problem for you. It turns all of the memory space inside a single **StarBoard2** into a Memory Disk that will survive a warm-reboot! When your Amiga attempts to grab a **StarBoard2** in Sticky-Disk mode, a hardware signal prevents the system from acquiring the **StarBoard2** as FastRAM (and thereby erasing your files) –instead it is re-recognized as a Memory Disk and its contents are preserved intact. If you want to work rapidly with large files of data that are being constantly updated (such as when developing software) you can appreciate the Sticky-Disk!

Fast RAM –no waiting!

StarBoard2 is a *totally* engineered product. It is a ZERO WAIT-STATE design, auto-configuring under AmigaDOS 1.2 as Fast RAM. Since AmigaDOS 1.1 doesn't support autoconfiguration, we also give you the software to configure memory in 1.1.

Any applications software which "looks" for Fast RAM will "find" **StarBoard2.** And you'll find that your applications run more efficiently due to **StarBoard2** on the bus.

A passing bus? Indeed!

What good is an Expansion Bus if it hits a dead end, as with some memory cards? Not much, we think –that's why we carefully and compatibly passed through the bus so you could attach other devices onto your Amiga (including another **StarBoard2**, of course!).

The sum of the parts...

A really nice feature of the **StarBoard2** system is that you can buy exactly what you need now without closing off your options for future exapansion. You can even buy a 0k **StarBoard2** (with a one megabyte capacity) and populate it with your own RAM (commonly available 256k by 1 by 150ns memory chips). When you add **StarBoard2** to your Amiga you have a powerful hardware combination, superior to any single-user micro on the market. See your Authorized Amiga Dealer today and ask for **StarBoard2**

SUGGESTED RETAIL PRICING:	
StarBoard2, 0k (1 meg space):	$349
StarBoard2, 0k (2 meg space):	$395
StarBoard2, 512k (1 meg space):	$495
StarBoard2, 1 meg (1 meg space)	$595
StarBoard2, 2 megs installed:	$879
StarBoard2, 2 megs & MultiFunction:	$959
Upper Deck, 0k (1 meg space):	$ 99
MultiFunction Module:	$ 99
also available:	
Standard 256k memory card:	$129
MAS-Drive20, 20 meg harddisk:	$1495
MouseTime, mouseport clock:	$ 50

MicroBotics, Inc.
811 Alpha Drive, Suite 335, Richardson, Texas 75081 / (214) 437-5330

Circle 103 on Reader Service card.

```
  FOR I=0 TO 15
    I2=I+16
    FOR J=1 TO 3 : SWAP P(J,I),P(J,I2) :NEXT J
    PALETTE I2,P(1,I2)/15!,P(2,I2)/15!,P(3,I2)/15!
  NEXT I
  SWITCH=-SWITCH
  IF SWITCH=-1 THEN MENU 2,1,1,"LOWER PALETTE"
  IF SWITCH =1 THEN MENU 2,1,1,"UPPER PALETTE"
  RETURN

SWAPCOL: 'exchange two colors
  LOCATE 3,2 : PRINT "SELECT COLOR TO BE SWAPPED"
  GOSUB SELECT
  FOR J=1 TO 3 : SWAP P(J,COL),P(J,I2) :NEXT J
  PALETTE COL,P(1,COL)/15!,P(2,COL)/15!,P(3,COL)/15!
  PALETTE I2,P(1,I2)/15!,P(2,I2)/15!,P(3,I2)/15!
  LOCATE 3,2 : PRINT STRING$(26," ");
  RETURN

SPREAD: 'interpolate between two colors
  LOCATE 3,2 : PRINT "SELECT COLOR FOR SPREADING"
  GOSUB SELECT
  ISTEP=1 : IF I2<COL THEN ISTEP=-1
  R!=I2-COL : IF R!=0 THEN RETURN
  FOR J=1 TO 3 : RGBS!(J)=(P(J,I2)-P(J,COL))/R! : NEXT J
  FOR I=COL+ISTEP TO I2-ISTEP STEP ISTEP
    FOR J=1 TO 3 : P(J,I)=P(J,COL)+RGBS!(J)*(I-COL) :NEXT J
    PALETTE I,P(1,I)/15!,P(2,I)/15!,P(3,I)/15!
  NEXT I
  LOCATE 3,2 : PRINT STRING$(26," ");
  RETURN

COPYCOL: 'copy one color to another
  LOCATE 3,2 : PRINT "SELECT COLOR FOR COPYING"
  GOSUB SELECT
  FOR J=1 TO 3 : P(J,I2)=P(J,COL) : NEXT J
  PALETTE I2,P(1,I2)/15!,P(2,I2)/15!,P(3,I2)/15!
  LOCATE 3,2 : PRINT STRING$(26," ");
  RETURN

MIXCOL: 'mix two colors
  LOCATE 3,2 : PRINT "SELECT OTHER COLOR"
  GOSUB SELECT
  FOR J=1 TO 3 : P(J,COL)=(P(J,COL)+P(J,I2))/2 : NEXT J
  PALETTE COL,P(1,COL)/15!,P(2,COL)/15!,P(3,COL)/15!
  LOCATE 3,2 : PRINT STRING$(26," ");
  RETURN

CHBRIGHT: 'change the brightness of a color
  LOCATE 3,2 : PRINT "PRESS ANY TWO KEYS TO CHANGE"
  MAX=-100
  FOR I=1 TO 3
    RGB(I)=P(I,COL)
    IF RGB(I)>MAX THEN IMAX=I : MAX=RGB(I)
  NEXT I
  IF MAX=0 THEN GOTO CHEND
  FOR I=1 TO 3 : RGBS!(I)=RGB(I)/MAX : NEXT I
  IOFF=0 : A$="" : B$=""
CHLOOP:
  C$=INKEY$
  IF C$="" THEN GOTO CHLOOP
  IF A$="" THEN A$=C$
  IF B$="" THEN B$=C$
  IF A$=B$ THEN B$=""
  ISTEP=0
  IF C$=A$ THEN ISTEP=-1
  IF C$=B$ THEN ISTEP=1
  IF ISTEP=0 THEN GOTO CHEND
  IOFF=IOFF+ISTEP
  FOR I=1 TO 3
    RGBN(I)=RGB(I)+IOFF*RGBS!(I)
    IF RGBN(I)>15 THEN RGBN(I)=15
    IF RGBN(I)<0 THEN RGBN(I)=0
  NEXT I
  PALETTE COL,RGBN(1)/15!,RGBN(2)/15!,RGBN(3)/15!
```

Listing continued on p. 78.

Hors d'oeuvres

Unique applications, tips and stuff

You may be using your Amiga at work, at home, or in the back seat of your car, but somehow you'll be using it in a unique way. You will discover things that will let you do something faster, easier or more elegantly.

AmigaWorld would like to share those shortcuts, ideas, things to avoid, things to try, etc., with everyone, and we'll reward you with a colorful, appetizing, official *AmigaWorld* T-shirt. (Just remember to tell us your size.)

Send it in, no matter how outrageous, clever, humorous or bizarre. We will read anything, but we won't return it, so keep a copy for yourself. In cases of duplication, T-shirts are awarded on a first come, first serve basis.

So, put on your thinking berets and rush those suggestions to:

Hors d'oeuvres
***AmigaWorld* editorial**
80 Elm Street
Peterborough, NH 03458

```
  FOR J=1 TO 3 : P(J,COL)=RGBN(J) : NEXT J
  GOSUB ALLCOLOR
  FOR I=1 TO 100 : NEXT I
  GOTO CHLOOP
CHEND:
  LOCATE 3,2 : PRINT STRING$(28," ");
  RETURN

SELECT: 'select second color
  WHILE MOUSE(0)<>1 : WEND
  I2=(MOUSE(1)-15)/10+16
  RETURN

EXITPALETTE: 'exit from program
    MENU RESET
    WINDOW CLOSE 2
    SCREEN CLOSE 2
    END

INITPALETTE: 'initialize color palette
    PALETTE 6,1!,1!,1!
    PALETTE 7,1!,0!,0!
    PALETTE 8,0!,1!,0!
    PALETTE 9,0!,0!,1!
    COL=16
    FOR I=0 TO 31
      FOR J=1 TO 3 : P(J,I)=I MOD 16 : NEXT J
      IF I>15 THEN PALETTE I,P(1,I)/15!,P(2,I)/15!,P(3,I)/15!
    NEXT I
    GOSUB ALLCOLOR
    RETURN

INITMENU: 'initialize menus
    MENU 1,0,1,"STORE"
    MENU 1,1,1,"SAVE COLOR TABLE"
    MENU 1,2,1,"LOAD COLOR TABLE"
    MENU 1,3,1,"SAVE SUBROUTINE"
    MENU 2,0,1,"SPECIALS"
    MENU 2,1,1,"LOWER PALETTE"
    SWITCH=-1
    MENU 2,2,1,"SWAP COLOR"
    MENU 2,3,1,"SPREAD COLOR"
    MENU 2,4,1,"COPY COLOR"
    MENU 2,5,1,"MIX COLORS"
    MENU 2,6,1,"CHANGE BRIGHTNESS"
    MENU 3,0,1,"ACTIONS"
    MENU 3,1,1,"EXIT PROGRAM"
    RETURN

ALLCOLOR: 'repaint palette
    GOSUB RED : GOSUB GREEN : GOSUB BLUE : GOSUB MIX
    FOR I=0 TO 15 : LINE (10+I*10,1)-(20+I*10,10),I+16,BF : NEXT I
    LINE (10+(COL-16)*10,1)-(20+(COL-16)*10,10),10,B
    RETURN

MIX: 'display selected color
    PALETTE COL,P(1,COL)/15!,P(2,COL)/15!,P(3,COL)/15!
    PALETTE 10,(15-P(1,COL))/15!,(15-P(2,COL))/15!,(15-P(3,COL))/15!
    LINE (180,30)-(240,80),COL,BF
    RETURN

RED: 'adjust red color gauge
    LINE (10,30)-(170,40),7,BF
    X=10*P(1,COL)+10
    LINE (X,30)-(10+X,40),6,BF
    RETURN

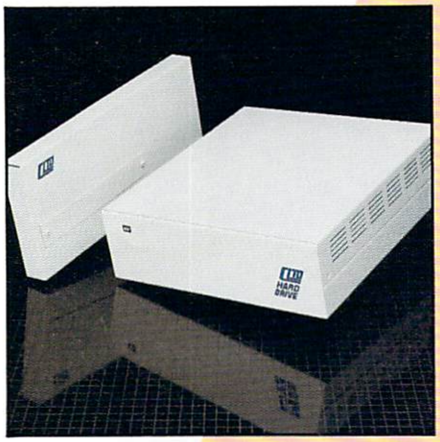
GREEN: 'adjust green color gauge
    LINE (10,50)-(170,60),8,BF
    X=10*P(2,COL)+10
    LINE (X,50)-(10+X,60),6,BF
    RETURN

BLUE: 'adjust blue color gauge
    LINE (10,70)-(170,80),9,BF
    X=10*P(3,COL)+10
    LINE (X,70)-(10+X,80),6,BF
    RETURN
```

Circle 59 on Reader Service card.

20-Meg SCSI Hard Drive $999^95

- Full AutoConfig
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Defender of the Crown

Don your chainmail and prepare to ride. The kingdom's safety is in your hands.

Looking for a little adventure in your life? Try Defender of the Crown, a combination strategy, arcade, role-playing game that takes you back to the time of stouthearted knights and fair maidens. Defender of the Crown is the first in a series of "movie-like" games from Master Designer Software that combine traditional computer-game elements with plot and characters. As a story and a strategy game, Defender of the Crown succeeds wonderfully; it only falters in its arcade sequences.

The game begins with the death of King Richard I. The kingdom is divided between six knights—three Saxons and three Normans. As one of those Saxon knights, your task is to unify the country by conquest and expel the Norman invaders.

You do have help: Robin of Locksley—better known as Robin Hood—has pledged to come to your assistance three times in your quest. His aid will be invaluable as the game progresses.

Defending the Crown

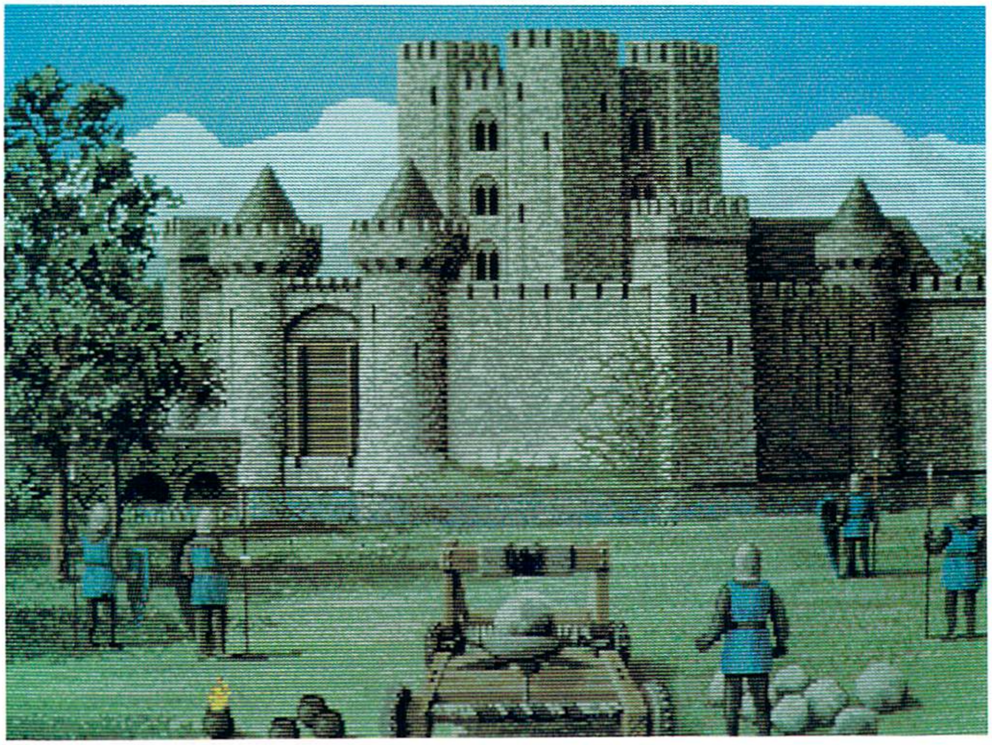
England is divided into 18 territories. Six are the home territories of the original knights; the remainder are ripe for conquest. Conquering a territory gives you the allegiance of the vassals who live there and a regular income that you can use to build your army. Conquering all 18 territories wins the game and brings peace to the land.

Each turn in Defender of the Crown represents one month. After the computer adds your current income to your treasury, you choose your plan of action for that turn. You can hold a jousting tournament to win land or fame, raid an opposing castle for treasure, seek conquest, build your army or read the map. You can access the last two options as often as you wish. The first three, however, are exclusive options—you can only choose one per turn. Though you can use the conquest option to move your army between territories you already own without ending your turn, you can only conquer one territory per "month."

Conquering territories is the prime objective of Defender of the Crown, and in this aspect, the game plays a lot like Risk, the strategy board-game from Parker Brothers. I like this side of Defender of the Crown best for, although the game mechanics are simple, you can employ some subtle strategies in acquiring land. My favorite is to sit back and let the other players—all controlled independently by the computer—battle for a choice territory. After they've exhausted one another, my relatively fresh army has no problems taking over.

Jousts, Rescues and Raids

Although conquest is paramount, the outcome of Defender of the Crown is also dependent upon the arcade elements of the game. And, although these sequences feature beautiful graphics and animation, they are simplistic. For instance, if you elect to try to conquer an enemy castle, you will first have the opportunity to breach the castle walls with a catapult. After two or three attempts, you will be a catapult expert and bored by future breach attempts. A similar complaint holds for the rescue and raiding ►



Circle 52 on Reader Service card.

The World's 'Next Generation' Music Studio...



Desktop Multi-Media Production.

Nowhere has technology moved so fast as in todays music studios. Two years ago MIDI was just being established as an industry standard and the number of music software manufacturers could be counted on one hand. Over the same period music video has gone from experimental to an established art. Computers, video and music have joined to make musicians multi-media technology artists.

Now Mimetics and Commodore-Amiga move into the next generation technology by combining affordable computers, music and video into a single integrated system which stretches beyond music videos and creates a completely interactive real-time music video environment which is totally modular with expandability to every arena of the music performance arts.

Just imagine...one central machine that can score synthesizers, digital audio samples, drum machines, audio processors and mixing consoles for a complete soundtrack while it's also animating broadcastable color graphics mixed with live video, processed with special effects and edited into a final multi-media production!

Mimetics' SoundScape PRO MIDI Studio's unique modular design provides the power and flexibility necessary to connect and synchronize the various programs with internal and external music synthesis, SMPTE, video tape and processing systems. It, by itself, is the state-of-the-art music system. Combined with Amiga's video power, SoundScape gives you a completely new dimension in music and video production environments.

See the 'next generation' possibilities for music and video, today, at your nearest Amiga/music/video dealer, or contact Mimetics for more information.

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(408) 741-0117

The Professional Software Source.



scenes, which require you to wield a sword. Once again, the controls available to you (moving the mouse and double-clicking the left button) don't offer a wide-enough range of options to hold your interest.

Although the arcade controls are simplistic, they are important in developing the story line and on the outcome of the game. If you can manage to rescue a Saxon lady, she will (after a charming romantic interlude) become your wife and help you become a better leader. If you're successful in raids and rescues, your men will look up to you and be better fighters. If you win a joust, you can win a territory outright. The interplay of the arcade and strategy elements in the game is excellent; I just wish that the arcade elements were more challenging.

King for the Day

While Defender of the Crown is not the first game I've played that has a movie-like plot (Karateka from Broderbund comes to mind), it is certainly the best game that successfully combines strategy, arcade and role-playing elements with a fun story line and beautiful graphics and sound. (The graphics, by the way, are the work of noted Amiga artist Jim Sachs.) Better yet, it is a game that doesn't grow stale the first time you win. It has its faults—arcade aficionados should stay away—but Defender of the Crown is a giant leap forward in computer game design. It is an intelligent piece of software that will appeal to people who like to think and have fun, all at the same time.

—B. Ryan

Defender of the Crown
Master Designer Software, Inc.
5743 Corsa Avenue
Westlake Village, CA 91361
Distributed by Mindscape, Inc.
$49.95
512K required, 2nd disk drive optional

MAS-Drive20 20 Megabyte SCSI Hard Disk and Controller

Though it's cornered the hard drive market, the MAS-Drive20 isn't strong enough to be the cornerstone.

Hard to believe, but it's been over a year since the Amiga began shipping, and, at this writing, MicroBotics is the only company producing hard drives. True, you can still find some Tecmar drives floating around, and perhaps a few from The Micro Forge as well, but if you want to buy a hard drive from a company that is active in the Amiga market, you'll either have to wait a little longer or you'll have to buy a MAS-Drive20.

The MAS-Drive20 is a professional-looking unit. Twenty megabytes of storage are packed in an oblong box three inches high, seven inches wide, and nearly 15 inches long. Unlike the Micro Forge Hard Disk (July/August '86, p. 92), the MAS-Drive20 is self contained; the SCSI (Small Computer System Interface) controller and power supply are inside the same unit that houses the drive. The MAS-Drive20 comes in a metal cabinet that is color coordinated with the Amiga. The front of the case sports the disk-access light. On the back there's a power switch, a replaceable fuse, male and female D-25 parallel ports and a female D-37 SCSI port. Only a power-indicator light is lacking.

Configuring the System

The MAS-Drive20 is easy to set up. Once you have it unpacked, attach it to the Amiga parallel port using the supplied cable, and attach your parallel printer to the MAS-Drive20. The software included with the drive configures your parallel port as a SCSI port. Normally, you can daisy-chain up to seven devices from a SCSI port. Although this feature has yet to be implemented with the MAS-Drive20, the necessary D-37 connector is present on the drive.

Getting your Amiga system software to recognize the MAS-Drive20 is more involved than setting up the hardware. The instructions provided, however, are very helpful. The important thing to remember is that the MAS-Drive20 will operate only under Version 1.2 of Kickstart and Workbench. Problems with the 1.1 port drivers make the drive unusable under the earlier operating system. Since it doesn't use the expansion bus, the MAS-Drive20 is not an auto-config device: You have to run a program to mount the device on the system whenever you start up your Amiga.

After booting your Amiga with Workbench 1.2, execute the accompanying batch file to configure your system. The batch sequence replaces the standard Amiga parallel driver with one that allows the parallel port to double as a SCSI port, mounts the MAS-Drive on the system, and formats the drive. It also changes the startup-sequence of your Workbench disk so that the MAS-Drive will be mounted and recognized as the system disk whenever you boot up.

Although I had to replace the standard Amiga parallel driver with a custom driver, I had no problems using my parallel printer, a Star Micronics NL-10, with the MAS-Drive20. Apparently, the custom parallel driver is a superset of the standard driver. The documentation does state, however, that you shouldn't use the custom parallel driver without the MAS-Drive20, nor should you use the standard printer driver with the MAS-Drive20 attached. The former may result in gibberish for output; the latter may corrupt the hard disk.



I did have problems using Applied Visions' FutureSound sound digitizer with the MAS-Drive20. FutureSound is a parallel device, so I daisy-chained it to the MAS-Drive20. Whenever I turned FutureSound on, however, the MAS-Drive stopped working. On the plus side, MAS-Drive20 worked perfectly with the auto-config memory devices that I tried (Alegra and aMEGA).

Slow But Steady

If I had one word to describe the performance of the MAS-Drive20, I would choose ►

"good." In a normal configuration, the drive worked "first time, every time."

The MAS-Drive20 is not blindingly fast. For instance, loading Preferences from the MAS-Drive20 was only slightly faster—eight seconds versus nine—than loading it from a floppy. In other comparisons, the hard drive did better. It took the MAS-Drive 20 seconds to copy a c directory (48 files and 435 blocks) to the RAM: disk; the same copy from a floppy took 50 seconds. Copying 1,225 blocks to RAM: took 126 seconds for the floppy; 53 for the hard drive. The MAS-Drive20 reads two- to two-and-a-half times faster than a floppy.

The MAS-Drive20 showed a greater advantage in writing to disk. Copying 438 blocks (49 files) from RAM: to the MAS-Drive20 took 30 seconds; it took 155 seconds to write the same material to a floppy. That's a five-fold speed advantage for the MicroBotics' entry—not earth shattering, but respectable. The MAS-Drive20 isn't going to win any awards for speed, but it certainly outperforms floppies.

The Special Edition

The MAS-Drive20 I evaluated was a dealer/developer model: It had the same hardware and basic software as the consumer model, but it lacked printed documentation and some utilities. Using the software and the limited documentation I did receive, I not only had the disk running in about an hour—including 40 minutes of nothing but formatting—but I was later able to easily partition the disk into three smaller, more manageable volumes. The ReadMe file documentation was clear and concise. With the commercial package, MicroBotics promises a backup utility, a park utility, a write-verify option and a surface-diagnostic utility.

Fifteen-hundred bucks is a lot to pay for a 20-megabyte hard disk, but, if you've got to have one, then you don't have much choice. The MAS-Drive 20 is a solid, reliable system that uses a Seagate Technologies drive at its core. With the assumption that the utility software is as good as the rest of the system (an assumption I'll test for the next issue), I think the MAS-Drive20 is a good, solid piece of work. I'd like it better if it were faster and/or cheaper, and I don't particularly like having to keep disks with custom parallel drivers separate from regular disks. But, given that it exists, I'm not complaining too loudly.

—*B. Ryan*

MAS-Drive20
20 Megabyte SCSI Hard Disk and Controller
MicroBotics
PO Box 855115
Richardson, TX 78085
214/437-5330
$1,495.00
Requires Amiga Operating System Version 1.2

Logistix

This integrated package may offer something for everyone, but none of it is Amiga specific.

By Ted Salamone

Logistix, a high-end business product developed by Grafox of England and marketed by Progressive Peripherals & Software, integrates a spreadsheet, a database and graphics with a project planner timesheet. This is unique considering the usual



nature of such programs: spreadsheet, database, graphics and word processing or telecommunications. The timesheet makes Logistix more of a manager's tool than its competition.

The program consists of two unprotected disks, a program master and an examples disk. Owners are advised to make copies. A dongle or key which plugs into the joystick port provides copy protection. Logistix runs only if it finds the key. Don't lose it, the manual warns, the key is irreplaceable. Even though Grafox wants you to believe there's no way around this one and only key conundrum, there actually is. Dongles from other PP&S programs work fine.

First You Kick the Tires

Integrated programs are known for the limits placed on each module. Though somewhat true of Logistix, the program circumvents this by making heavy use of overlays in a 512K environment. With 1 MEG or more, overlays are eliminated and the processing speed picks up.

The spreadsheet runs 1,024 columns by 2,048 rows, sports average cursor movement capabilities and includes almost six dozen built-in functions. Advanced date, day, lookup and trig functions provide a glimpse of the power waiting to be unleashed.

The timesheet is a helpful resource planner. Users position manpower, materials, machinery and services over time to bring a job to completion within an allotted timeframe and budget. Rescheduling the components to reflect real life allows users more flexibility in planning and decision making. Knowing in advance the ramifications of missed deadlines and penalty charges, you can handle any team project effectively.

Grafox imbued Logistix with a cornucopia of graph types (two pie, two bar, line scatter GANTT and others), 10 fill patterns, 10 fonts, 10 line types, numerous color palette choices, 10 character sizes and 10 scattergram markers. You can open up to four graphs simultaneously, memory permitting.

The database routine allows you to sort on more than one key or column and to extract, find and delete files. "Logistixically" speaking, you can set up data tables and perform inquiries. If the need arises, you may import dBase (version not specified), 1-2-3, Supercalc, DIF, comma separated value (CSV) and text (ASCII) files.

Export is another story. While no procedure is available, it is possible to send saved formats (Logistix, CSV, DIF) via a hardwired configuration or modem.

Infinite Instructions

The user's manual is impressive, both in its size and its thoroughness. A 50-page supplement explains the changes in version 1.1. The introduction briefly discusses each facet of the program and the user's guide handles the rest, with the aid of appendices, an index and a glossary.

It is replete with working examples, references and crystal clear screen shots. Slash commands and operators are explained in detail.

However, once again the spector of MS-DOS intrudes. Logistix is a port from the

IBM PC. So, the manual actually refers to, and is identical to, the MS-DOS version. Therefore file paths are incorrect and non-Amiga keys are continually referenced. This is confusing and counterproductive and needlessly prolongs the training period.

A mere three pages are devoted explicitly to the Amiga. One of them gives you the good news that Kickstart 1.1 crashes the system when low memory, approximately 25K or less, is encountered. Version 1.2 is supposed to correct this, even though the Beta 4 edition didn't.

Logistix also comes with a keyboard template, a simple affair with six of the F keys identified as to function. The others serve no purpose, though shifted F keys mimic their unshifted brethren. This is not documented.

The availability of on-line help is poorly documented, as well. F1 calls for help. Nowhere does it say "Press HELP key." Yet this works just fine, as does the "?" key.

Deeper Yet

The non-Amiga problem goes deeper than the manual. Betraying its humble origins, Logistix fails to support the mouse; nor does it know what a pull-down menu is. Lotus-like menus aren't even included; instead, slash commands, made famous by Visicalc, are the order of the day.

To get decent performance, eliminate overlays and reduce the chance of system crashes, Grafox recommends system memory of 1 MEG or more. This allows you to load one of the two other versions, providing higher resolution and more rows per screen in the process.

Logistix has the power to become the Amiga's 1-2-3 in sales. Unfortunately, it is buried beneath an MS-DOS facade and unrealistic memory demands.

The ability to create auto commands as well as the more traditional macros is overwhelming. Limited to 254 characters, Autos are automated command sequences tied to a particular key. Macros, as an Auto superset, are limited only by available memory. They reside in the worksheet and help tailor applications and operations.

While worksheets can be joined and graphs produced from database, spreadsheet or timesheet inputs, there is no hot-link facility to interactively update graphs as data changes are made.

Multitasking is supported, though it may only be a reality with 1 MEG or more. It is recommended that Logistix be loaded through CLI to spare some room for worksheets. As it now stands, the smallest ►

version occupies 417K, leaving a mere 95K free.

All basic spreadsheet and database functions are included. Logistix more than fills the bill where features are concerned, but this completeness actually causes problems.

Power With a Price

The spreadsheet operates in a straightforward, if antiquated, manner (Visicalc interface). The graphic capabilties are amazing for an integrated package of this complexity. Unfortunately, a lot of work is needed to harness their power.

Defining a chart is a near Neanderthal task. First you specify the chart type, then instead of setting ranges, you must reenter the chart type command on every data line. Labels, fonts, size and all other graph attributes are set through worksheet commands. Even if most of this can be automated through macros, the whole setup is a mindless exercise. A few clicks on icon choices followed by range designation could handle the entire task in much less time, regardless of macros.

It is hard to get excited about Logistix on a 512K machine. Even considering fewer disk accesses and other benefits of more RAM, Logistix falls short because it does not follow the unique Amiga interface. Software should take advantage of machine-specific functions.

On the other hand, the program is bulletproof. Its error trapping is exemplary; the error messages even make sense. Only the operating system is buggy. The developers managed to provide a surprisingly complete set of programs, not an easy task in such a heavy-duty integrated package.

Tweaking Is the Key

Overall, Logistix 1.1 is a good first step. An update addressing the MS-DOS problem among others would make Logistix one of the hottest selling Amiga programs on either side of the Atlantic.

As much as I felt I should like this program, there are too many performance penalties and too few Amiga incentives to make it really effective. But, as an IBM program it must really shine.

Logistix
Progressive Peripherals & Software
464 Kalamath
Denver, CO 80204
303/825-4144
$249.95
Requires 512K

Money Mentor
PAR Home 1
PHASAR Financial Manager
2 + 2 Home Management System

A comparison review of four personal financial management programs.

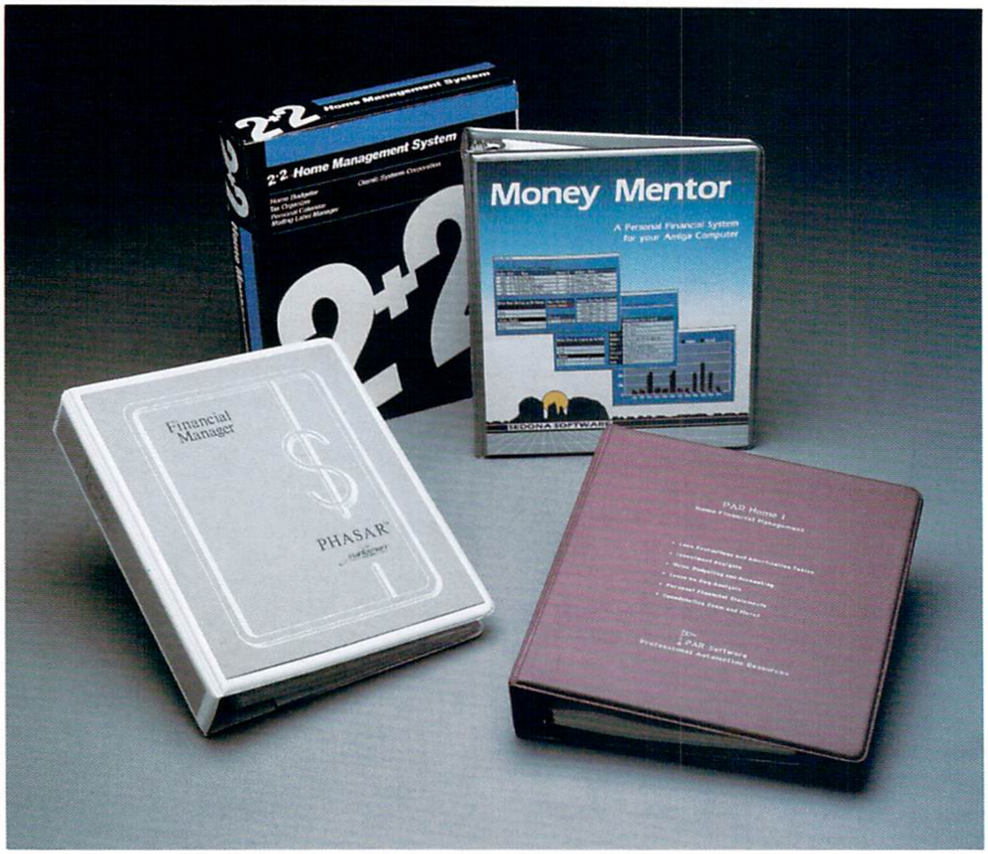
By Peggy Herrington

Personal financial management programs are based on business accounting procedures. Beyond the fact that you can get the same general findings from a spreadsheet program (provided you know how to set it up), personal financial programs *should* be easier to learn and use and their commands easier to remember because they are also for people unacquainted with business accounting. They are less elaborate, but more flexible than spreadsheets, because most of us don't need to account for every penny that crosses our palms.

I used the personal financial management programs covered in this comparative review to track my household finances from the start of 1986. Besides having the best documented "books" west of Fort Knox and finding that I'm further in debt than John Henry, here's what I discovered in the process.

PHASAR

My hands-down favorite was PHASAR from Marksman Technology. It's fast and easy to use and there are no account numbers to fool with. A full-screen editor means entries and changes are easy to accomplish and the program makes intelligent guesses based on previous entries, which you can easily defeat if necessary. It has an optional on-screen calculator and lets you combine various income and expense accounts to analyze standings in discrete areas (a part-time business, for example), even though all your transactions are entered in one program module so you can determine your overall standing. It has a phone number listing and reminds you of special occasions on start-up. Loan comparisons and savings account analysis are available and it uses the mouse and pull-down menus to great advantage. It also incorporates a special tax module which, among other things, will project ►



PHOTOGRAPH BY LARRY DUNN

your income taxes so you don't get surprised on April 15th.

2 + 2 Home Management System

Olamic's 2 + 2 takes a more traditional approach. Because of this, and since it doesn't employ pull-down menus or the mouse, it is harder to use than PHASAR. It does use account numbers and requires that you set up accounts in a separate area before you can enter expenses, but it's a good, solid program and is the only one that offers password security and will process repetitive groups of payments. The manual is very good with a reference section arranged in program menu order and cross-referenced to the tutorial. You can record things that don't affect cash balances and print mailing labels or envelopes (and special checks, although I didn't find it very practical; of the four, only PHASAR will not do this). It also has separate phone directory, daily appointment and calendar modules. If you have some knowledge of accounting and are pretty well organized, you're more likely to like 2 + 2.

Personal Financial Management Software Features

	PHASAR	*2 + 2*	*PAR Home*	*Money Mentor*
Suggested retail price	$89.95	$99	$69	$95.95
Version reviewed	2.10	2.26	1st	1.3
Uses special Amiga features	Yes	No	Some	Some
Automates repetitious entries	Yes	Yes	No	Yes
Processes groups of entries	No	Yes	No	No
Tracks payroll taxes	Yes	No	No	No
Does profit and loss statements	Yes	No	No	Yes
Does net worth statements	Yes	No	No	No
Helps reconcile bank statements	Yes	Yes	Yes	Yes
Prints checks	Yes	Yes	No	Yes
Tracks non-cash expenses	Yes	Yes	No	Yes
Printer output to disk files	Yes	Yes	No	No
Multitasks with other programs	Yes	Yes	Yes	Yes

PAR Home 1

PAR Home 1 from PAR Software is relatively weak in its accounting section and in that respect suffers by comparison with the other programs mentioned here. It has 19 fixed expense accounts (you can determine your own in the other programs), and although you can enter up to 12 checking accounts, expenses and budgets for each account are recorded and analyzed separately from the others. On the strong side, PAR Home 1 offers many financial analysis modules that the others don't, and in that respect, is more comparable to—though less extensive than—Electronic Arts' Financial Cookbook. Included are such things as loan amortization, asset appreciation, investment analysis (annuities, IRA versus CD, college investment and life insurance planners) and a Spendaholic's Exam that will comment on your economic character, or lack thereof. Unfortunately, the program is rather sluggish in response because it was written in ABasiC.

Money Mentor

I was disappointed with Sedona Software's Money Mentor. It is visually attractive and easy (if slow) to use, with on-screen menus and audible prompts. One of it's strongest features is a window that automates entries by letting you scroll through previously entered names, dates and accounts, type the first letter or two and then click the mouse pointer on the one you're after. These "smart scrolls" are nifty. But during a print operation, I adjusted my printer and found I couldn't get to a requestor box behind the program window (although I'd been able to previously with Amiga-N and -M). I had no choice but to bomb out of the program, and doing that destroyed all my entries; they were wiped from the disk. Believe these people when they tell you to make backups of your data disks! Money Mentor is being reprogrammed in Modula 2 (from Amiga Basic) and upgrades will be available to registered owners for a small fee. I have hopes for the revision because I liked the program's fundamental design. In fact, if it hadn't been for that data loss, I would recommend Money Mentor for new computer ►

users with relatively straightforward financial situations.

Do's And Don'ts

All these programs use single-entry (as opposed to double-entry) accounting methods and are interactive in that data entered in one module is automatically incorporated into others (except for the calendar and address/phone listings and PAR Home's analysis and net worth statement). All allow multiple checking and credit accounts and come in sturdy 3-ring plastic binders with good documentation, although again, I liked PHASAR's best. None of the programs are copy-protected. Each will let you enter budgets, but not one of them even hints at cash flow analysis (so you can gauge if you'll have sufficient funds to pay things on time), and I think there are enough people who don't get regular paychecks to warrant this feature. I used RS Data System's 2-Megabyte Expansion RAM board to test whether these programs would multitask. See the chart for the results of those findings and some other comparisons.

Money Mentor
Sedona Software
11844 Rancho Bernardo Road, Suite 20
San Diego, CA 92128-9901
619/451-0151
$95.95
No special requirements

PAR Home 1: Home Financial Management
PAR Software Inc.
PO Box 1089
Vancouver, WA 98666
206/695-1368
$69
Requires 512K

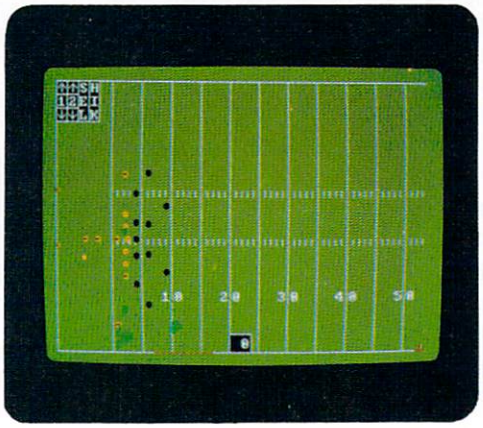
PHASAR Financial Manager
Marksman Technology Inc.
Route 5, Box 221A
Santa Fe, NM 87501
505/455-2681
$89.95
Requires 512K

2+2 Home Management System
Olamic Systems Corp.
141 West Jackson Blvd.
Chicago, IL 60604
312/786-1410
$99
Requires 512K

Gridiron!

So, you think you can call the plays better than the pros? Here's your chance to prove it!

Take an Amiga computer, add a dash of Newton's Laws of Motion, combine these with a generous helping of the NFL rulebook and the result is Gridiron!, an absorbing, meaty simulation of NFL football. Unlike many other computer games, Gridiron! has staying power: It doesn't get stale after a couple of days.



Gridiron! is a one- or two-player game. You battle the computer, or, in the two-player version, your opponent uses a second mouse or joystick. There are five levels of play: practice, beginner, intermediate, advanced and pro. The speed and "intelligence" of your computer opponents increase with each level.

Gridiron! is a combination strategy and action game. Whether you're on offense or defense, you can choose one of 20 plays to throw at your opponent. The plays detail the role of each player on the field. On offense, for instance, some players will have a blocking assignment while others will run specific pass routes. Defensive players can go after the ball carrier, persue laterally, or cover a man or a zone.

If you don't like a particular play, or if you want to design an entirely new offense or defense, the play creation utility requires a minimum of fuss. You can also change the capabilities and physical attributes of individual players.

Hike

Once a play begins, you control one of your players with a mouse or joystick. On offense, you're always the ball carrier: You start out controlling the quarterback. If the quarterback passes or hands off, you control the player who receives the ball.

On defense, you control the free safety by default. You can change the default on any play, however, by clicking on the player you want to control before the ball is snapped. If, for instance, you think that the offense is going to run a play to the strong side, you could get closer to the action by clicking on the safety or linebacker on that side.

Not only do the players obey the laws of football; they also observe the Laws of Motion. Players can't "stop on a dime" or change direction instantaneously. The computer simulates the effects of gravity and inertia when it moves the players on the field. This makes Gridiron! a very convincing simulation of football. You also have the option of introducing random events into the game. Gridiron! lets you specify if you want random penalties and fumbles.

Success with Gridiron! takes a combination of good play calling and near-flawless execution. Before a play begins, you have to determine your best offensive or defensive play, based upon time remaining, score, down and yards-to-go and field position. Once the ball is snapped, you have to read the play as it develops and execute accordingly. For instance, if you see a reverse developing in your opponent's backfield, you can get your defender into position to break it up. On offense, you can read how the defense is covering your receivers and throw away from the coverage, just as you would in an actual football game.

The graphics used with Gridiron! are simple but not crude. Each player is represented by a colored circle; the field is an overhead view of an NFL playing field. (Looks like artificial turf to me.) I've seen flashier games than Gridiron!, but the simplicity of the graphics doesn't detract from the game. The digitized sounds used in the game add to the sense of realism.

But Where's John Madden?

Gridiron! is an excellent physical simulation of an idealized NFL game. And, since it also features random events, it unfolds very much like a real football game. The only thing missing from Gridiron! are teams of players that reflect the capabilities of actual NFL rosters. (I'm told this will be included in a future release.) Regardless, Gridiron! is the best game I've played on my Amiga.

—B. Ryan

Gridiron!
Bethesda Softworks
9208 Burning Tree Rd.
Bethesda, MD 20817
800/992-4009
$69.95
No special requirements.

Gold Spell—Spelling Checker & Corrector

Do you write with one hand on the dictionary and the other on the keyboard? Do the words "spelling bee" make you break out in a cold sweat? If so, read on . . .

Gold Spell is just what you would imagine, a spelling checker. It contains over 90,000 words, is compatible with Textcraft, Scribble! or any Amiga word processor that can save files in ASCII (text only) format, and it lets you add words to your own dictionaries.

Gold Spell is very easy to use. Just load it up and tell it the name of the file you want to check (including drive numbers, directories, which word processor was used, etc.) and it automatically starts checking the document. If it finds a word it does not recognize, it stops and highlights the word while displaying the complete sentence. You then may correct the word on the spot, accept (skip) the word, "accept & remember" the word (useful for adding words to your own private dictionaries), ask Gold Spell to suggest the correct spelling, or scan the dictionary to try and find the right spelling yourself. When you find the right spelling, all you have to do is click on it and it will automatically be inserted into your document.

After you have finished checking the document, Gold Spell saves the corrected version back to your document disk using the original name, simultaneously saving the old, uncorrected version with the extension .BAK on the end. At that time you can update your personal dictionary with words that you have "accepted and remembered."

Checking the Checker

There are some nice features of Gold Spell that go beyond just checking spelling. You can also test a document for readability. Gold Spell will analyze a document and give you the Gunning Fog index (a number that roughly equates with grade-level reading abilities needed to comprehend your document; a Fog index of 8 means an eighth-grade reading level). You can create your own dictionaries either by adding "accept & remember" words after each session, or you can create or modify personal dictionaries with any word processor, as long as it saves files in ASCII. Personal dictionaries can be as large as your Amiga's memory will allow. The ability to scan the dictionary is a plus (other spelling checkers do not have this feature), and just clicking on the correct word to replace a misspelled word is very handy. Gold Spell is fast since the dictionary is loaded into RAM. You can also check individual word spellings without having to type them into a word processor first.

Gold Spell's few drawbacks are more like annoyances than problems. It would be convenient to be able to set the defaults once rather than having to reset them each time ►

you use the program. It would also be nice to modify the way it saves files in cases where you want the uncorrected document to have the original name and the corrected file given the extension .BAK. It would be helpful to have the program automatically load the personal dictionary instead of having to "manually" load it. (This is more of a sacrifice than a problem, because with Gold Spell's system you can create many different custom dictionaries and load them as needed for the type of document you wish to check.) It is also a bit annoying to have it freeze on every word in quotes or with an 's or s' (like Spell's). Finally, while figuring the Fog index number of a document, Gold Spell flashes a running word and sentence count as it works, but the total is only on the screen for an instant at the end. Why can't we see the total word and sentence count at leisure in a box next to the Fog index number?

I liked Gold Spell. In fact, I think it is an excellent program at a very good price that does everything it claims and more (although it doesn't recognize the word "misspelled"). If you have a word processor, you should have Gold Spell, too.

Gold Spell—Spelling Checker & Corrector
Gold Disk Inc.
PO Box 789 Streetsville
Mississauga, Ontario L5M 2C2
$45.95
Requires 512K

Computer Baseball

Now even a bleacher bum can manage the all-time greats.

The best simulations of baseball, both computerized and tabletop, are the ones that give you the responsibilities and options of a real manager. With Computer Baseball from Strategic Simulations Inc. (SSI), you can do everything a major league manager can do except argue with the umpire.

You have the opportunity to manage some of the greatest teams of all time. Twenty-six great pennant-winning teams, opponents in 13 of the most memorable World Series, are included on the disk; these teams are described in a booklet of Famous World Series Matchups if you're interested in replaying a series of the past. Additional data disks with statistics for the 1980–85 major league teams are also available for $15. A disk with all the major league clubs from the most recent season will be available by mail from SSI six months after the baseball season ends.

You can also enter, save and revise data for any team you choose, either real or imaginary. You could create an all-time all-star roster or enter data for your nephew's Little League team. The manual gives instructions for entering player data, but it takes a fair amount of work.

To load the program, you need copies of Workbench and Amiga Basic. To simplify startup, you can install Amiga Basic on the Baseball game disk. You can play a game against the computer, a two-player game or manage both teams yourself. An imaginary manager named Casey will be your opponent when challenging the computer. After choosing the two teams, you select your starting pitcher and lineup from the team's roster, which appears on-screen with statistics for each player. If you're playing against Casey, you can select the starting lineup for his team or let him do it himself.

Play Ball

The screen display includes a scoreboard, current batter and pitcher data, a line for input and a playing field. The field shows you the positioning of the fielders and the base runners. As far as graphics go, the screen isn't much to look at, but it doesn't really need to be. The designer wisely placed his emphasis on providing statistical accuracy and plenty of options, not window dressing.

All input is done through the keyboard, with one- or two-keystroke commands. For quick reference, consult the players' aid cards, which list all offensive and defensive commands.

As each batter comes to the plate, the manager on defense is prompted for a strategy. He can pitch to the batter, pitch around him or intentionally walk him. Other defensive actions can be taken before pitching to the batter, including positioning infielders and outfielders and going to the bullpen. You can move your infield to double-play depth, guard the lines, bring them in at the corners or in all around. Outfielders can be kept at normal depth or moved to shallow positions. You can even visit the mound to find out how your pitcher is doing. Once the ball is pitched, the offense can choose to hit away, hit and run, bunt or steal. You can also bring a pinch hitter or pinch runner into the game.

As a play unfolds, the outcome is printed at the bottom of the screen. The play is also rather crudely animated on the field; it's just enough to give you a feel for what's happening. The confrontation between hitter and pitcher is decided on one pitch, another wise design choice. Going to a full count on a batter, only to have him foul off the next five pitches, is too tedious for a computer or tabletop simulation; games using that format are slow and boring. Computer Baseball moves at a good pace; the average game lasts about half an hour to 45 minutes.

The outcome of each play is determined by a number of statistical parameters, including the hitting, running, fielding and pitching abilities of the players involved. You'll find that the individual players in Computer Baseball perform remarkably close to the way they do (or did) in real life. How well they play as a team has a lot to do with how you manage them.

The handling of pitchers is where your managerial decisions will have the most influence on the outcome of the game. Starters tire as the game wears on, and relievers must be warmed up before they are brought in to pitch, just as in real baseball. You have to know your pitchers and think ahead.

If you're competing against Casey, you'll find him to be an effective manager. He makes decisions quickly, based purely upon the statistics. One problem with him is that he also chooses a lineup strictly according to statistics, so he sometimes comes up with something that is very unorthodox for that particular team. You can get around this by choosing the lineup for him.

After each game, you can display the end-of-game statistics and line score on the screen or send it to your printer. You can also save a game in progress and finish it later.

There is still some room for improvement in Computer Baseball. The screen could be more attractive, sound effects could be added, and the animation could be better, but I wouldn't want any of this at the expense of the game's current features.

Computer Baseball gives you realism without sacrificing playability. The degree to which you, as a manager, are involved in the game, and the sheer number of factors involved in determining the outcome of each play make this the most realistic baseball simulation I've played.

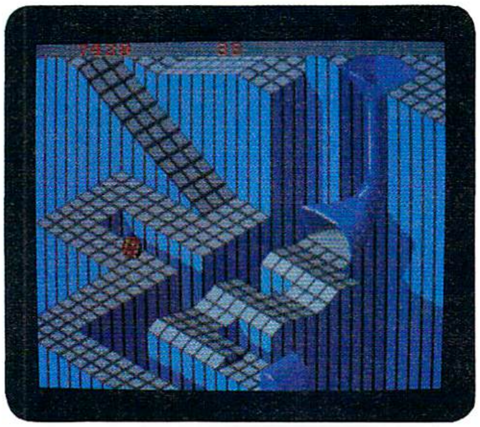
—S. Laflamme

Computer Baseball
Strategic Simulations Inc.
1046 N. Rengstorff Ave.
Mountain View, CA 94043
415/964-1353
$39.95
No special requirements.

Marble Madness

Get out the rubber nose, Bozo wants to play marbles. No quarters necessary for this madcap micro excellence.

When a micro edition of a flashy, popular video-parlor arcade game is released, you expect an abridged, pale, whittled-down version of the original—something like your first game of whiffle ball. Electronic Arts' Marble Madness, licensed from Atari and popularized on Atari arcade machines, will forever broaden your expectations—it did mine. The power of the Amiga plus the programming expertise of Will Harvey and Larry Reed (who did the Amiga version) have made Marble Madness a first-rate micro arcade game.



Losing Your Marbles

Marble Madness is an animated-action-strategy-coordination ball-and-mazes sit-on-the-edge-of-your-chair type game. It consists of numerous screens that contain tracks, ramps, jumps, moving floors and other indefinable animated obstacles, along which and through which you must direct a ball, which itself doesn't always agree to obey the laws of physics. Various little "hoovers," "marble munchers" and black "steelies" ►

await you along the path to interrupt you and steal your most precious possession—*time*. Other banes to your success pop up here and there to bonk you, whack you, roller-coaster you and bump you off the path. When you fall, if you hit a hard surface, you go *splat* and a little broom appears and sweeps you up, or you reel as if dizzy, or you drop into, well, marble-nowhere. Of course, as long as you still have time left in the level, your ball reappears where it went awry, but you have lost *time*, the main thing against which you play in this game. And how quickly you finish one level determines the time you'll have for the next one; it does make some sense—how disgusting.

The sounds in the game are funny and clever; the stereo music is excellent accompaniment (though I often turn it down since it can heighten the excitement to a dizzying pitch). The colorful 3-D graphics are so good, they must be seen to be appreciated. The package calls the raceway screens "Escher-like"; I agree. Maybe Rube Goldberg- and Dr. Seuss-like too. But, they have been dressed with a twisted, carnival fun-house feel that, along with the sound, very successfully creates a madcap atmosphere. Bozoville! Marble Madness gets a gold star in the visual category. In overall design, it is probably the most consistent micro arcade game I have seen.

The game does have a few shortcomings. The levels each take a long time to load. (It does, however, give you time to regain your sanity before the next screen.) It is too bad that you have to go back to the beginning level every time the clock runs out, and start again from scratch. The game, like most arcade games in general, is sort of designed around this approach. You can't save a game or pause the action (my *main* complaint—what if the phone rings!); at least the instructions don't say so if you can. I found that playing with two players was confusing and not as much fun as alone. Also, I found the mouse to be the most accurate means of control—quite a bit better than with a joystick (I don't have a track ball), and two players using mice presents a logistical problem.

Rubber-nose (or room) Award

Marble Madness is a tremendous micro arcade game, and surely one of the best—if not *the* best—arcade games for any microcomputer. It is rivalled at this time in the category of Amiga games only by a few others, such as Commodore's Mindwalker. It is a "set piece" in challenging, zany, goofy, animated microcomputer entertainment. If you only buy a handful of games for your Amiga, Marble Madness should be one of them.

—V. Laughner

Marble Madness
Electronic Arts
1820 Gateway Drive
San Mateo, CA 94404
415/571-7171
$49.95
No special requirements

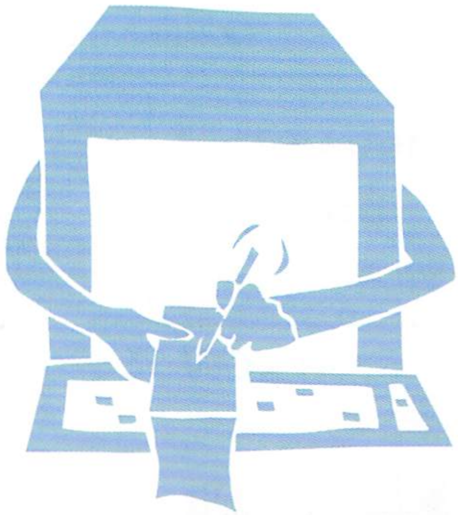
Review Update

Scribble! Version 2.0

The programs they are 'a changin'—often faster than our staff can review them. Take a look at the improvements to Scribble!, originally reviewed in Jan./Feb. '87 (p. 78).

By Douglas Watt

Scribble! has undergone extensive renovation, rectifying a number of the difficulties discussed in my last review. Mail merge functions were added, and a spelling checker program was built into the word processor. The new directory access and directory requester layout makes loading and saving files easier and more intuitively logical in "feel." Instead of being forced to access menus, you can now use command key sequences for all cutting and pasting functions. A truly page-oriented screen is still lacking, however. Once again you are stuck with embedded commands to change margins and other formatting variables instead of having the option to load formatting directives into a line-by-line buffer ("what you see is what you get" on the screen).



Pick a Word, But Not Any Word

Perhaps the most significant change is the spelling checker. Running the dictionary from a RAM disk is relatively easy to set up; simply rewrite the startup-sequence file found in the "S" directory. With the dictionary in RAM, the program is capable of rapid document checks, and the UDICT (user-defined dictionary) can be left on the Scribble! disk so that new words are saved to the disk. Since the current dictionary is rather small, you will have to make many additions for it to find even relatively commonplace words.

Besides running more effectively under Kickstart and Workbench 1.2, Scribble! 2.0 contains some enhancements only available with these versions. Using the updated Kickstart and Workbench, you no longer need to click the left mouse key on an input prompt within a requester. You can automatically enter information from the keyboard. All requesters accept first-letter commands instead of having to click on the individual icons, speeding up the use of requesters considerably. If a requester is looking for an "OK" or "CANCEL", the letters "O" or "C" are accepted from the keyboard.

The requester boxes themselves have been substantially upgraded, and you are now able to get, store or replace a file while Scribble! is still reading through the directory. Alphabetically sorted directories and a directory scroll option have also been added. With the new requester, you do not have to wait for the entire directory to appear before selecting another drive or subdirectory name. While a directory is currently displaying, enter a new drive/path and hit the return key. Scribble! will abort the current listing and begin the new one.

Search and Replace are now located under the Project menu and can be accessed with the Right-Amiga S and R keys, respectively. This allows any of the text actions (Cut, Paste, etc.) to be used with Search and Replace, since they are now effectively separated. Additional menu functions, such as Project Status and Archive Document, defaults for line-length and tabs and text copy, cut and paste, can now be accessed through the keyboard. "Word delete" has been added, and WordStar commands are also supported. "True backspacing" wraps the cursor up to the end of the previous line when you reach the left column.

Window Dressing

Scribble!'s status line window has been removed, allowing easier window sizing, but preventing the deletion of status lines. So, the full window is not available for text. Up to four open windows are still supported. Any Text selection will remain the same no matter what window you are in. If the mouse pointer is in Cut mode, it will stay that way as you switch from window to window. But, the mouse pointer now changes to a paint roller when highlighting and also allows window scroll. You can cut multiple screens of text by holding the right mouse key down and moving the paint roller to the top or bottom of the screen. The window automatically scrolls in that direction. To abort, move the paint roller to any one of the four corners of the screen and the highlighted text will disappear without making any changes. In addition, the cursor position remains constant when any option under the Text menu is selected other than Edit. This means that if you copy, cut, paste, style or spell using the mouse pointer, the cursor position will remain the same after the function has been completed. If using only one window, Scribble! will prompt you to quit the program.

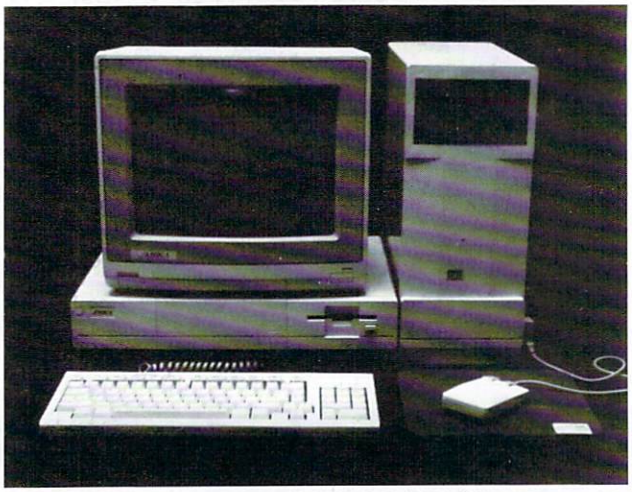
Scribble! now uses dynamic file load allocation to determine window size when loading a file greater than 16K. With an expanded memory card, the function loads files of over 290K, a major improvement over the previous limit of 64K.

Scribble! also has increased flexibility when loading from the CLI. Entering Scribble! = 100 DF1: will load Scribble! with a 100K buffer and automatically log into drive DF1: when archiving documents. If you enter a filename after the drive/volume designator, Scribble! will load the document for you.

Though they neglected to add a page-oriented screen and upgrade the printer support, Micro Systems was right on target with their other revisions. Scribble! 2.0 is now a powerful word processor ready for a variety of applications.■

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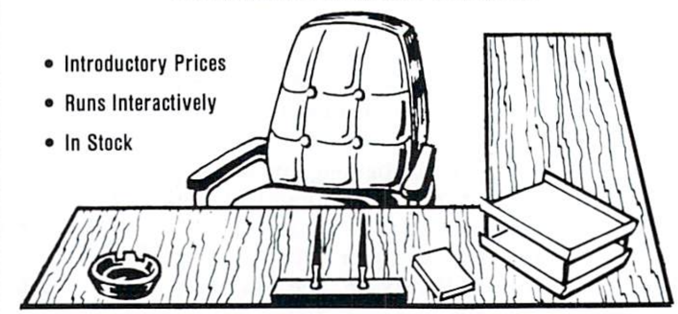
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Compiled by Bob Ryan

Amiga Takes Off!

Flight Simulator II, Bruce Artwick's graphics tour de force, has been upgraded for the Amiga. It features faster screen updates and more detailed scenery than the Apple II or IBM PC versions. You can have two view windows on the screen at the same time. Flight Simulator II uses pull-down menus, but they are not Amiga standard. The Amiga version also lets you fly in formation with a friend via a cable or modem connection, and fly a Learjet instead of a Cessna 182.

Flight Simulator is a comprehensive simulation. You have to master the same controls found in an actual airplane to be a successful pilot. Flight Simulator II lists for $49.95. For more information, contact subLOGIC Corp., 713 Edgebrook Drive, Champaign, IL 61820. 800/637-4983 (in Illinois, 217/359-8482).

Hard Disk Duet

Recently, Xebec and Supra Corporation announced hard-disk drives for the Amiga. Xebec offers two Amiga-compatible drives, the **9710H** and the **9720H**. The former offers 10 megabytes of storage; the latter has 20 megabytes. Both drives connect to the Amiga expansion bus via a SCSI (Small Computer System Interface) that is included with the drive system. The SCSI adapter also allows for up to 2 megabytes of RAM expansion.

The 9700 series requires Kickstart 1.2. Up to four drives can be daisy chained at once, and the drives can be partitioned. The installation software also includes comprehensive diagnostics. The 9710H sells for $895; the 9720H for $1,295. For more information, contact Xebec, 3579 Highway 50 East, Carson City, NV 89701. 702/883-7128.

Like the Xebec drives, Supra's three hard-disk systems use the SCSI. They also include a real-time clock with battery backup and the capability to add RAM expansion modules containing up to 4 megabytes of RAM.

The Amiga **SupraDrive 4X4** comes in three capacities—20, 30 and 60 megabytes. Their retail prices are $995, $1,195 and $1,995, respectively. For more information, contact Supra Corp., 1133 Commercial Way, Albany, OR 97321. 503/967-9075.

Sonix Boom

The latest from Aegis Development is a note-editor and MIDI-sequencer called **Aegis Sonix**, the "son of Musicraft." Aegis bought the program from Commodore and upgraded it considerably. Sonix lets you enter and edit musical compositions, create and edit your own instrument sounds, and control up to 16 external MIDI devices.

In addition to its own instrument and sample files, Sonix supports IFF music and instrument files, allowing you to swap data with other Amiga music programs. It supports all possi-

ble keys, durations down to sixteenth notes, and many different time signatures.

Sonix retails for $79.95. For more information, contact Aegis Development Inc., 2210 Wilshire Blvd. #277, Santa Monica, CA 90403. 213/306-0735.

A Picture *and* A Thousand Words

ProWrite is a new word processor from New Horizons Software. Prowrite is designed to take advantage of the Amiga's capabilities, including multitasking and graphics. You can open up to eight windows at one time, and include IFF color graphics in your documents.

In addition to multiple styles, ProWrite lets you use multiple fonts. It also lets you use different colors for your text, and to print them with a color printer. ProWrite uses the Amiga Intuition interface, and retails for $124.95. For more information, contact New Horizons Software Inc., PO Box 43167, Austin, TX 78745. 512/329-6215.

They Call Him Flipper. . .

Tired of your spreadsheets getting cut in half by your 80-column printer? Try **Flipside!**, a new text utility from Micro-Systems Software. Flipside! prints any Amiga text file sideways, giving you an unlimited number of columns across a page. Flipside! works with popular Amiga spreadsheets and word processors including Micro-Systems' own Analyze! and Scribble!.

Flipside! sells for $49.95. For more information, contact Micro-Systems Software Inc., 4301-18 Oak Circle, Boca Raton, FL 33431. 800/327-8724.

Powered RAM

MEGAmiga is a one-megabyte RAM expansion box for your Amiga. It attaches to the expansion bus, has a built-in 20-watt power supply, and auto-configures under Kickstart 1.2. MEGAmiga passes through the Amiga bus, allowing for further expansion.

MEGAmiga costs $512. A user-installable upgrade kit that brings the total memory to 2 megabytes lists for $256. Contact Analog Precision Inc., 1620 N. Park Ave., Tuscon, AZ 85719. 602/622-1344.

Learning Fun

Unicorn Software has released **Decimal Dungeon** for the Amiga. The game takes place in a crystal cavern, and students have to answer questions correctly to escape from the cavern. The program, for students aged nine and up, teaches math skills such as decimal addition, subtraction, multiplication and division, and conversion between decimals and fractions. Decimal Dungeon lists for $49.95.

Coming soon from Unicorn Software are **Kinderama**, **Read & Rhyme**, **Math Wizard**, **Frac-** ▶

Hors d'oeuvres

Unique applications, tips and stuff

You may be using your Amiga at work, you may be using it at home, or you may be using it in the back seat of your car, but in some way or other, you are going to be using your Amiga in a slightly different way than anyone else. You are going to be running across little things that will help you to do something faster or easier or more elegantly.

AmigaWorld would like to share those shortcuts, ideas, unique applications, programming tips, things to avoid, things to try, etc., with everyone, and we'll reward you for your efforts with a colorful, appetizing, official *AmigaWorld* T-shirt. (Just remember to tell us your size.)

Send it in, no matter how outrageous, clever, obvious, humorous, subtle, stupid, awesome or bizarre. We will read anything, but we won't return it, so keep a copy for yourself. In cases of duplication, T-shirts are awarded on a first come, first serve basis.

So, put on your thinking berets and rush those suggestions to:

Hors d'oeuvres
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tion Action and **Animal Kingdom**. For more information, contact Unicorn Software Co., 2950 E. Flamingo Road, Greenview Park, Suite B, Las Vegas, NV 89121. 702/737-8662.

LaserJet Meets The Amiga

C Ltd. makes it easy to use a Hewlett-Packard LaserJet Plus with your Amiga. **JetSet** contains three utility programs. The JetSet Textcraft/Scribble Utility lets these two word processors use multiple fonts in their documents. The fonts are menu-selectable from the word processor and can be downloaded to the LaserJet Plus.

The JetSet LaserJet Command Set lets you control a LaserJet Plus with simple commands. The JetSet Text Formatter reads formatted commands in Amiga text files and translates them into instructions to control the LaserJet Plus. The JetSet package sells for $69.95.

Also from C Ltd. comes JetSet Fonts, which can be downloaded to the LaserJet Plus. Each disk contains a single font in sizes from four to 30 points. Disks cost from $49.95 to $99.95. Contact C Ltd., 723 East Skinner, Wichita, KS 67211. 316/267-6321.

Visual Data

Taurus has released **Aquisition**, a potent database management system that takes advantage of the Amiga's powerful user interface. Aquisition uses menus, icons and requesters to guide you through the process of creating, editing and using databases. The program has an enormous capacity to store data. Fields can be up to 10 megabytes long with 10 million fields per record and one-hundred million records per file. The maximum file size is one billion bytes. The maximum number of files in one application is 16.

Aquisition supports all major relational, arithmetic and logical operators. It supports five data types and four file types—including IFF picture files. Although the power of Aquisition is available solely from menus, you can use Acom, a dBase-III-compatible language, to manipulate your data.

Aquisition lists for $299. Contact your local dealer or Taurus-Impex Ltd., 3 Bridge St., Guildford, Surrey, GU1 4RY, England.

Who Needs Editors?

Reason is a software package that proofs, analyzes and provides language-use information about your word-processing documents. Reason proofreads text for spelling errors, grammatical goofs and punctuation glitches, and analyzes readability and clarity. Reason will be helpful to anyone who needs to communicate clearly with the written word.

Reason is available from The Other Guys, 55 North Main Street, Suite 301-D, PO Box H, Logan, UT 84321. 801/753-7620.

Clever Deductions

Double Eagle Software can help you with your 1986 Federal Income Tax return. **The Tax Advantage** supports IRS Form 1040 and a host of subsidiary forms and schedules. Output from The Tax Advantage can be printed directly onto Form 1040 or as a rough draft to be hand copied to the form.

The program lists for $59.95. Contact Double Eagle Software Inc., 2210 Wilshire Blvd., Suite 875, Santa Monica, CA 90403. 213/459-9748.

Stylish Text

Earthbound Software has two packages for the Amiga. **Fonts** is a disk of Macintosh-like fonts, listing for $11.95. **Font-A-Size** is a patch to the Amiga Writable

Control Store that scales Amiga fonts to any size. Font-A-Size sells for $14.95.

Also coming soon from Earthbound Software is **Taskmaster**, a multitasking utility, **Strategic Defense**, a missle defense-type game, **Fine-Font**, a utility that gives you near-letter quality output on an Epson or compatible printer and **Fine-Fonts**, a library of fonts for use with Fine-Font. Contact Earthbound Software, Suite #237, 1005 E. 60th St., Chicago, IL 60637. 312/667-8048.

Two for Businesses

B.E.S.T. Business Management, from Business Electronics Software & Technology, is an integrated business management system. It includes Order Processing, Inventory Management, Services Management, Accounts Receivable, Accounts Payable and General Ledger. B.E.S.T. Business Management integrates the accounting functions. It automatically updates related modules when a change occurs in one. B.E.S.T Business Management retails for $395. Contact Business Electronics Software and Technology Inc., PO Box 230519, McMinnville, OR 97128. 503/684-6655.

Computerware has also released a line of business software featuring **Accounts Payable**, **Accounts Receivable**, **Payroll**, **General Ledger** and **Check Ledger**. These modules can run as stand-alone packages, as an integrated system, or in conjunction with Computerware's **General Inventory System**. Each program costs $99. Contact Computerware, Box 668, 4403 Manchester Ave., Suite 102, Encinitas, CA 92024. 619/436-3512.

Product Updates

Lattice (PO Box 3072, Glen Ellyn, IL 60138. 312/858-7950) has released version 3.10 of the **Amiga C Compiler**. The new version includes a Lattice assembler and linker. The compiler features faster math routines, support for the Amiga FFP format floating-point library and object modules that are 20 percent smaller than those produced by the current Lattice compiler.

Softwood Co. (PO Box 2280, Santa Barbara, CA 93120) has released **MiAmiga File II**. The program now has Save As, scrolling directories, named ASCII files and more. Look for an updated review of this product in our next issue.

Interactive Microsystems (PO Box 338, Cambridge Center, Cambridge, MA 02142) has a version of **MediaPhile** that controls the EV-A300 Sony 8mm videotape deck. The entire package—including the deck—costs $699. If you already own a Sony 8mm deck, you can have it modified to work with MediaPhile for $120. Modification of other decks is more expensive.

Newsbriefs

The **Amiga Microsoft BASIC Programmer's Guide** is a 384-page softcover book devoted to Amiga Basic. Written by William B. Sanders, the book is published by Scott, Foresman and Company, 1900 East Lake Ave., Glenview, IL 60025. It retails for $19.95.

Sound Effects Library is a six-disk set of digitized sounds in IFF format that costs $99.95. You can add the 290 digitized sounds to any program using IFF sound samples. Contact Karl R. Denton Associates, PO Box 56, Westland, MI 48185.

Electronic Arts is now distributing **Star Fleet 1**, a strategic space game based upon a popular TV and movie series (guess which one). The game costs $55. For more information, contact Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404. 800/245-4525 (in CA, 800/562-1112).■

Listing 1. play.c.

```
#include <exec/types.h>
#include <exec/exec.h>
#include <intuition/intuition.h>
#include <graphics/gfx.h>
#include <graphics/sprite.h>

#define ACCURACY 2          /* How many dots off the target is still a hit */

/* An array of word pairs that defines the shape of our alternate pointer */

UWORD ptr_data [] =
{
    0, 0,
    0xfffe, 0xfffe,
    0xe10e, 0xe00e,
    0xe10e, 0xe00e,
    0xe10e, 0xe00e,
    0xe10e, 0xe00e,
    0xe10e, 0xe00e,
    0xfffe, 0xe00e,
    0xe10e, 0xe00e,
    0xe10e, 0xe00e,
    0xe10e, 0xe00e,
    0xe10e, 0xe00e,
    0xe10e, 0xe00e,
    0xfffe, 0xfffe,
    0, 0
};

/* Pointers to the libraries we will load */

struct IntuitionBase *IntuitionBase;
struct GfxBase *GfxBase;

main()
{
    struct Window *my_window;          /* Pointer to our window's info */
    struct IntuiMessage *message;    /* Pointer for event messages */
    ULONG class;                        /* Class of the event message */
    USHORT code;                         /* Code of the message */
    SHORT ptrx, ptry;                  /* Mouse pointer's coordinates */
    SHORT boxx, boxy;                   /* Target box's coordinates */
    long millis, oldmillis = 0;      /* Millisecond counters */
    long score = 0, total = 0;        /* Score and total score */
    int numhit = 0;                      /* Number of "hits" */

/* Open the main Intuition library and the graphics library.  Exit
    with an error if the opens are unsuccessful */

    IntuitionBase = (struct IntuitionBase *)
        OpenLibrary ("intuition.library", LIBRARY_VERSION);

    if (IntuitionBase == NULL) exit (FALSE);
```

Listing continued on p. 104.

build the four corners of our box.

Text

Having done everything else, we still must display the score. Amiga text actually is a graphics object.

The calls you use to display text are similar to those you use to draw items. We use *sprintf()* to turn the numbers into an ASCII string. We then *Move()* to a location close to the upper left of the window. Finally, we display the text with the *Text()* function. *Text()* draws the text in the current font, which we assume is one of the system's default fonts.

Obviously, our sample program did not use all of the Amiga's many features. For example, we did not define our own screen or menu. We used no requestors or gadgets of our own. However, we used enough of the system's capabilities to give you a model for further experimentation. In one of the sidebars we suggest a few alterations.

Working with C requires practice, particularly with a system whose operating software is as complex as the Amiga's. We wish you the best in your C programming efforts! ■

Mark L. Van Name is vice president and co-founder of Foresight Computer Corp. and a freelance writer. Bill Catchings is a freelance writer and software developer. Write to them at 10024 Sycamore Road, Durham, NC 27703.

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Circle 41 on Reader Service card.

```
    GfxBase = (struct GfxBase *)
        OpenLibrary ("graphics library", LIBRARY_VERSION);

    if (GfxBase == NULL) exit (FALSE);

/* Create a window with the specified title.  Exit on error */

    if (wind_create (&my_window, "Fun and Games")) exit (FALSE);
/* Ask for mouse button, window closing and window sizing events */

    ModifyIDCMP (my_window, MOUSEBUTTONS | CLOSEWINDOW | NEWSIZE);

/* Modify my window's pointer to the shape defined in ptr_data.
    The new pointer is to be 13 dots high by 16 dots wide.  Make the
    center the activation point */

    SetPointer (my_window, ptr_data, 13, 16, -8, -6);

/* Display a target box and tell me where it is and when it was done */

    putbox (my_window, &boxx, &boxy, &oldmillis);

/* Do this forever! */

    while (TRUE)
    {

/* Wait until there is an IDCMP message for my window pending */

        Wait (1 << my_window -> UserPort -> mp_SigBit);

/* Get as many messages as are in the queue for my window's UserPort */

        while ((message = (struct IntuiMessage *)
            GetMsg (my_window -> UserPort)))
        {

/* Get the data we want from the message */

            class = message -> Class;
            code = message -> Code;
            ptrx = message -> MouseX;
            ptry = message -> MouseY;

/* Translate the event's time into milliseconds (approximately) */

            millis = (message -> Seconds << 10) + (message -> Micros >> 10);

/* Reply to the message */

            ReplyMsg (message);

/* Handle the message based on its class */

            switch (class)
            {
                case CLOSEWINDOW:               /* If the window is closed */
                    ClearPointer (my_window);   /* restore the pointer, */
                    CloseWindow (my_window);    /* close up the window */
                    exit (TRUE);                /* and exit */

                case NEWSIZE:                   /* Give a new target if resized */
                    putbox (my_window, &boxx, &boxy, &oldmillis);
                    break;

                case MOUSEBUTTONS:              /* If the mouse button is used */

                    if (code == SELECTUP)       /* and if it is a select up */
                    {

/* Check if the pointer and the box are close enough to count as a
    "hit".  If so, compute the score as the milliseconds since the box
    was displayed less than 3 seconds.  Make sure the score is not
    negative and add it to the total score.  Display the results */
```

Listing continued on p. 106.



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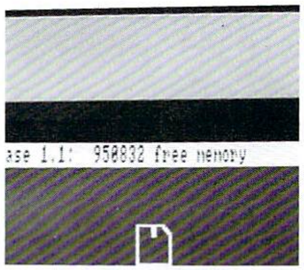
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Circle 54 on Reader Service card.

```
                        if (hit (ptrx, ptry, boxx, boxy))
                        {
                            score = 3000 - millis + oldmillis;
                            if (score < 0) score = 0;
                            total += score;
                            write_score (my_window, total, score, ++numhit);

                            putbox (my_window, &boxx, &boxy, &oldmillis);
                        }
                    }
                    break;
                }
            }
        }
}

/* This function creates a window with some "reasonable" default
    parameters.  The caller specifies the title of the window and
    the function fills in the value of the returned window pointer */

wind_create (window_ptr, title)
struct Window **window_ptr;          /* Pointer to a window pointer */
char *title;                          /* Requested title */
{
    struct NewWindow defwindow;

    defwindow.LeftEdge = 40;          /* Window starting left edge */
    defwindow.TopEdge = 40;           /* and top edge */
    defwindow.Width = 300;            /* The window's initial width */
    defwindow.Height = 100;           /* and height */
    defwindow.DetailPen = 0;
    defwindow.BlockPen = 1;
    defwindow.Title = title;        /* Use the caller's title */
    defwindow.Flags = SMART_REFRESH | ACTIVATE | WINDOWCLOSE |
        WINDOWDRAG | WINDOWSIZING | WINDOWDEPTH;
    defwindow.IDCMPFlags = CLOSEWINDOW;
```

```
    defwindow.Type = WBENCHSCREEN;
    defwindow.FirstGadget = NULL;
    defwindow.CheckMark = NULL;
    defwindow.Screen = NULL;
    defwindow.BitMap = NULL;
    defwindow.MinWidth = 100;          /* Resizing minimums and maximums */
    defwindow.MinHeight = 40;
    defwindow.MaxWidth = 640;
    defwindow.MaxHeight = 200;

/* Open the window as specified above.  Return failure if unsuccessful */

    if ((*window_ptr = (struct Window *) OpenWindow (&defwindow)) == NULL)
        return (-1);

/* Otherwise say that all is OK */

    return (0);
}

/* Display the score */

write_score (window_ptr, tot, score, hits)
struct Window *window_ptr;              /* Window for displaying */
long tot, score;                        /* Total and last score */
int hits;                                /* Number of hits */
{
    char str[16];
    int len;

/* Build the string, move to where want to put it and output the string */

    len = sprintf (str, "%04ld %04ld (%d)", tot, score, hits);
    Move (window_ptr -> RPort, 10, 20);
    Text (window_ptr -> RPort, str, len);
}
```

Listing continued on p. 108.

```
/* Display the target box and tell where it is and when it was drawn */

putbox (window_ptr, x, y, millis)
struct Window *window_ptr;             /* Window for displaying */
SHORT *x, *y;                             /* Where the box was displayed */
long *millis;                            /* When the box was displayed */
{
    static WORD corners[8];              /* Static box corner array */
    ULONG mic, sec;
    long tmp, rand();

    if (*millis == 0)                    /* If this is our first time */
    {
        CurrentTime (&sec, &mic);        /* Use a seed based on the time */
        srand ((unsigned int) mic);
    }
    else
    {

/* Subsequent times erase the old box.  Do this by taking the
   background pen and using it draw over the old box's coordinates
   that are still in the static array corners */

        SetAPen (window_ptr -> RPort, 0);
        Move (window_ptr -> RPort, corners[6], corners[7]);
        PolyDraw (window_ptr -> RPort, 4, corners);
    }

/* Get some random x and y coordinates that are within the range of
   our window's size */

    while ((tmp = (rand() & 0x3ff)) > window_ptr -> Width - 20);
    *x = tmp + 10;
    while ((tmp = (rand() & 0x1ff)) > window_ptr -> Height - 30);
    *y = tmp + 20;

/* Build the corners around the box's center */
```

```
corners[0] = corners[6] = *x - 4;
corners[1] = corners[3] = *y - 3;
corners[2] = corners[4] = *x + 4;
corners[5] = corners[7] = *y + 3;
/* Get pen number one and draw the box with it */

    SetAPen (window_ptr -> RPort, 1);
    Move (window_ptr -> RPort, corners[6], corners[7]);
    PolyDraw (window_ptr -> RPort, 4, corners);

/* Get the current time and translate it into milliseconds */

    CurrentTime (&sec, &mic);
    *millis = (sec << 10) + (mic >> 10);
}

/* Check if the user click the pointer "close enough" to the target */

hit (x1, y1, x2, y2)
SHORT x1, y1, x2, y2;
{
    SHORT dx, dy;

    dx = x1 - x2;                   /* Get the x and the y coordinate */
    dy = y1 - y2;                   /* differences */

/* if either difference is greater the ACCURACY required return
    false.  Otherwise return true */

    if (dx > ACCURACY || dx < -ACCURACY || dy > ACCURACY || dy
    < -ACCURACY)
        return (FALSE);
    else return (TRUE);
}
```

Help Key

Don't pull the plug. Send your letters to Amiga-World, *80 Elm St., Peterborough, NH 03458.*

By Bob Ryan

Moving Drivers

Q: In the November/December '86 issue, AmigaWorld *reviewed color printers. I now own a Canon PJ-1080A color printer. My problem relates to the driver. It works fine, but I don't know how to copy it to other disks. I've tried dragging Preferences from one Workbench to another, but with no success. How can I copy my printer driver onto other disks so that I can use my printer with those programs? Also, do you know if there is a printer driver available for the Gemini 10X?*

Fred Child Wendell
Freeville, NY

A: The Preferences program doesn't actually contain the Amiga printer drivers; these are contained in the Devs/Printers directory of your Workbench disk. Use the CLI to copy the Canon driver from the Devs/Printers directory of your Workbench disk to the Devs/Printers directory of your other disks. With a two-drive system, the command line would look like this:

```
COPY DF0:DEVS/PRINTERS/
    CANON_PJ1080A TO
    DF1:DEVS/PRINTERS/
    CANON _PJ1080A.
```

With a one-drive system, you'll have to use the volume names of the disks instead of the physical device name (df0:) and do some disk swapping as prompted.

Once you've copied the driver to a particular disk, boot your system with that disk and open Preferences. Go to the Change Printer screen and select *Custom* as your printer. Then click on the Custom Printer Name box and change the name to Canon_PJ1080A. Return to the main Preferences menu, click on Save, and your Canon driver is ready to go.

Regarding your second question, use the Epson driver to run your Gemini 10X with the Amiga.

Open Files, Custom Fonts and 1.2

Q: When working with Amiga Basic, I sometimes try to list my program to my printer, using either Llist or the long version of List, only to get a "File already open" message. What is the problem? Did I delete a necessary file somewhere? What file is already open?

Secondly, is there any easy way to edit the character set on the Amiga? I need math symbols for my work that are not available in any of the standard fonts. Is there a good font editor available for the Amiga?

Finally, what are the advantages of Kickstart 1.2, and will Commodore send free updates to Amiga owners?

Gunter Hartel
Englewood, CO

A: The "file" that Amiga Basic reports being open when you try to list a program is the printer device: Remember, Amiga Basic treats devices as files. My guess is that you opened the printer device in a program and then exited the program without closing the file. To take care of the problem, simply type CLOSE in the output window before listing the file.

The 1.2 Amiga Enhancer Software Kit has a font editor in the Tools drawer on the Amiga Extras disk. This is one good example of the 1.2 enhancements; other advantages of 1.2 over 1.1 have been pretty well covered in our info.phile columns in this issue and in the last issue. Everyone with an Amiga should upgrade to the new operating system.

The 1.2 enhancement (which contains Kickstart, Workbench and the Amiga Extras disk with, among other things, a revised Amiga Basic) is available as of this writing. My local dealer is selling it for $12.50: It is not a free upgrade.

Directory Suicide

Q: I have two AmigaDOS batch files for working with a RAM disk. As you can see, the first creates a C directory on the disk, moves the CLI commands to the disk, and then designates the Ram:c directory as the system command directory. The second file is supposed to delete the RAM disk.

```
makeram
echo "Putting DOS commands
   into RAM."
cd sys:c
makedir ram:c
assign x: copy
assign d: ram:c
x: assign d:
x: dir d:
x: delete d:
x: execute d:
x: copy d:
x: type d:
x: list d:
x: info d:
x: run d:
x: cd d:
x: ed d:
assign c: ram:c

killram
assign c: sys:c
delete ram:c/#?
delete ram:c
cd sys:c
```

My problem is with the second file; it fails to delete the Ram:c directory even though it does delete all the files in the directory. When I get to the command delete ram:c, *I get the message "Not deleted–object in use." Why can't I delete the C directory?*

Jim Ernest
APO, New York

A: I like the way that you made assignments for Copy and Ram:c in your Makeram file—thus cutting down your typing—but I think that this is the cause of your problem. I executed your files under both Workbench 1.1 and 1.2 and I encountered the same thing you did; the Ram:c directory will not delete. Before bashing my head against a wall, however, I tried something different: I removed your assignment of Ram:c to d: and edited Makeram, substituting Ram:c for d:. Lo and behold, when I ran Killram, the C directory was deleted. Problem solved.

Why did you get the "Object in use" message? I think the reason was simply that you had assigned a logical name to Ram:c. The system then considered Ram:c "in use" and wouldn't let you delete it.■

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☐ 1. GREAT! ☐ 5. Fair
☐ 2. Very Good ☐ 6. Poor
☐ 3. Pretty Good ☐ 7. Very Poor
☐ 4. Good ☐ 8. Terrible

B. What will be your next major peripheral purchase?
☐ 1. Monitor ☐ 6. Sidecar
☐ 2. Printer ☐ 7. Gen Lock or Frame Grabber
☐ 3. Modem ☐ 8. Music (Midi, Keyboard, etc.)
☐ 4. Memory Expansion ☐ 9. Other
☐ 5. Disk Drive (hard or floppy)

C. Check all of the endings that best complete this sentence: "Most of AmigaWorld is . . ."
☐ 1. Just Right ☐ 6. Useless
☐ 2. Too Simple ☐ 7. Interesting
☐ 3. Too Complex ☐ 8. Biased
☐ 4. Fluff ☐ 9. Invaluable
☐ 5. Useful

D. What topics would you like to see covered in future issues of AmigaWorld? (Please pick three.)
☐ 1. C Language ☐ 11. How others use the Amiga
☐ 2. Amiga Basic ☐ 12. Buyer's Guides
☐ 3. CLI ☐ 13. Comparative Reviews
☐ 4. Telecommunications ☐ 14. Music
☐ 5. Business Applications ☐ 15. Graphics
☐ 6. IBM Compatibility ☐ 16. Program Listings
☐ 7. Home Applications ☐ 17. New Products
☐ 8. Education ☐ 18. Opinions
☐ 9. Video ☐ 19. Hardware Projects
☐ 10. Science and Engineering ☐ 20. Other

E. What are your favorite things about AmigaWorld? (Please pick all that apply.)
☐ 1. Zeitgeist (Editor's Page) ☐ 6. Tutorials
☐ 2. Repartee (Letters) ☐ 7. Hors d'oeuvres (hints/tips)
☐ 3. Interviews ☐ 8. Advertisements
☐ 4. Help Key (Questions) ☐ 9. Reviews
☐ 5. Features ☐ 10. News
☐ 11. Digital Canvas ☐ 14. Reader Service Card
☐ 12. Articles ☐ 15. Everything
☐ 13. Covers

F. Which of the following categories do you plan to purchase software from in the next 12 months?
☐ 1. Entertainment ☐ 9. Database Management
☐ 2. Word Processing ☐ 10. Financial Management
☐ 3. Communications ☐ 11. Graphics
☐ 4. Spreadsheets ☐ 12. Education
☐ 5. Home Productivity ☐ 13. Music
☐ 6. Programming ☐ 14. Hardware Development
☐ 7. Software Development ☐ 15. Sound/Speech Development
☐ 8. Video/Graphics Creation ☐ 16. CAD/CAM

G. Have you ever purchased a product after receiving the information you've requested from an AmigaWorld reader service card?
☐ 1. Yes ☐ 2. No

H. Where do you buy your computer products? (Please pick one.)
☐ 1. Computer Dealer ☐ 4. Discount/Department Store
☐ 2. Mail Order ☐ 5. Other ______
☐ 3. Manufacturer

I. Do you own an Amiga?
☐ 1. Yes ☐ 2. No

J. Where do you use your Amiga?
☐ 1. Home ☐ 5. Both at home and work
☐ 2. Work ☐ 6. Both at home and school
☐ 3. School ☐ 7. I don't use an Amiga
☐ 4. At home for business

K. Is this your copy of AmigaWorld?
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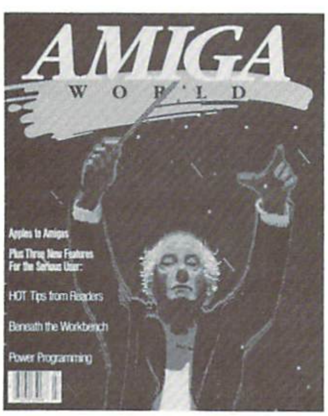
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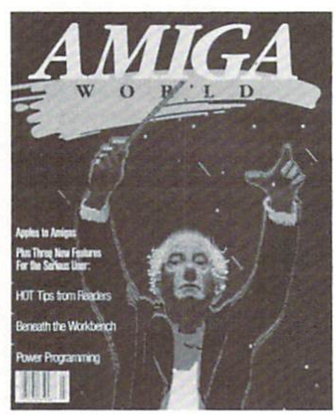
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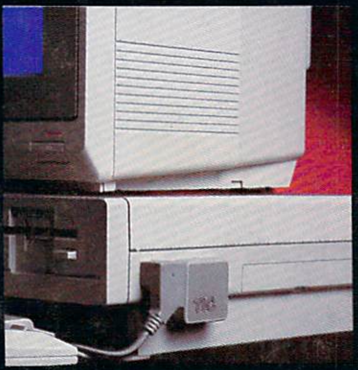
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